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## New Phytosanitary Regulations Allow Higher Imports of Avocados

Phytosanitary measures restrict or regulate imported food products to combat the entry and establishment of foreign pests and diseases. Import bans are sometimes used to reduce phytosanitary risks, but such measures can restrict the seasonal availability of a product or significantly raise costs for consumers. Advances in scientific risk assessment methods over the past decade have helped regulators design less trade-restrictive measures for some products, such as avocados, that reduce phytosanitary risks while allowing imports.

USDA initially banned imports of Mexican avocados in 1914 to prevent entry of avocado seed weevils into the United States. USDA's Animal and Plant Health Inspection Service (APHIS) partially lifted this ban in 1993 when it allowed Mexican avocados to be shipped to Alaska under the terms of an import protocol that stipulated production and shipping requirements. Since then, APHIS has revised the import protocol three times, gradually lifting geographical and seasonal restrictions. By 2005, Mexico had year-round market access to all States except California, Florida, and Hawaii, and it will gain access to



Corbis

those States in 2007. Safeguards—such as annual field surveys and packinghouse requirements—against the entry of avocado pests remain mandatory. These measures increase exporter production costs, but enable market access. Avocado imports from Mexico rose from just over 1 million pounds in 1993/94 to 296 million pounds in 2004/05, about half the total U.S. import volume.

The key to changes in U.S. import policy for Mexican avocados has been the adoption of a *systems approach* to risk management, consisting of a number of sequential safeguards designed to progressively reduce risk to an insignificant level. If one mitigating measure fails, the other safeguards are in place to ensure the reduction of pest or disease risks. The net benefits of these more targeted approaches to reduce pest and disease risks can be estimated under alternative scenarios.

The annual net benefits of lifting the geographical and seasonal restrictions, while maintaining the other phytosanitary safeguards that are currently required, were found to total about \$70 million. If these safeguards were removed, the expected pest-related costs would exceed the savings in compliance costs under most scenarios, reducing estimated economic gains. These estimates provide analytic support for the decision by APHIS to replace the ban on imported Mexican avocados with a more targeted systems approach.  $\mathcal{W}$

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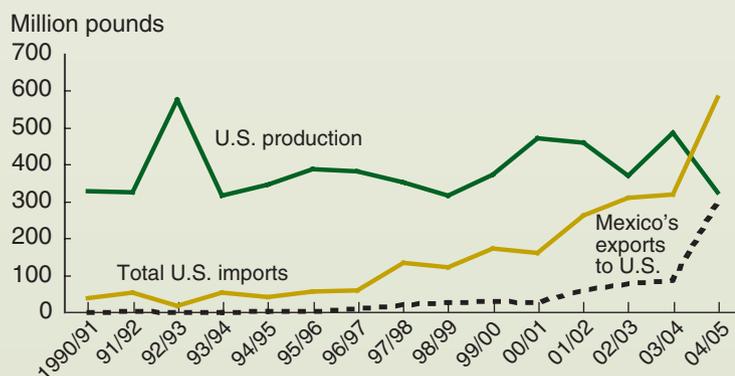
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**This article is drawn from . . .**

*Fruit and Tree Nuts Outlook*, USDA, Economic Research Service, available at: [www.ers.usda.gov/publications/fts/](http://www.ers.usda.gov/publications/fts/)

"Illustration of the Modeling Framework: Economic Effects of the U.S. Ban on Avocados from Mexico," in *A Framework for Analyzing Technical Trade Barriers in Agricultural Markets*, by Donna Roberts, Timothy E. Josling, and David Orden, TB-1876, USDA, Economic Research Service, March 1999, available at: [www.ers.usda.gov/publications/tb1876/](http://www.ers.usda.gov/publications/tb1876/)

### Imports gaining importance in U.S. fresh avocado market



Source: *Noncitrus Fruit and Nuts Summary* (various issues), National Agricultural Statistics Service, USDA; U.S. trade data provided by Bureau of the Census, U.S. Department of Commerce.

## Measuring the Importance of Exports to U.S. Agriculture

Record agricultural production and record agricultural export values have raised the question of how to calculate U.S. agriculture's reliance on exports. Because agricultural exports include such disparate commodities as wine and wheat, defining a common measure is challenging. A *value* measure is common to all, but tends to give more weight to high-value commodities. The importance of a bottle of wine compared to a bushel of wheat is then overstated. A *volume* measure requires conversion to a common unit and gives more weight to bulk commodities. It would take many bottles of wine to equal the volume of a bushel of corn. Clearly, combining bottles and bushels into a single basket of exported goods is problematic.

So how does ERS measure the importance of exports to U.S. agriculture? ERS publishes a volume-based indicator of the export share of agricultural production that covers only those commodities for which both production and export volumes are available. Thus, wines, greenhouse/nursery products, seeds, and hides/skins, for example, are excluded. By this measure, which is reported in the "Indicators" section of *Amber Waves*, the volume of agricultural exports as a share of production volume ranged from 21 to 23 percent over 2000-04.

U.S. producers of wheat, soybeans, and corn are all quite dependent on trade: exports account for close to half the volume of wheat production, more than a third for soybeans, and almost a fifth for corn. Among specialty crops, the export share is highest for almonds—nearly 70 percent—and more than 40 percent for walnuts and grapefruits. As the leading producer of almonds and walnuts in the world, the U.S. has a reputation for high-quality nuts demanded for snacking and confections.

The export share is much lower on the livestock side. Most meat and dairy products are produced and eaten domestically. Poultry exports are about 15 percent of production, and red meat exports are around 10 percent of beef and pork production on a volume basis. Disease outbreaks and related trade restrictions continue to constrain U.S. animal-product export markets, with cattle and beef markets affected most. **W**

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### For more information, see:

The ERS Briefing Room on U.S. Agricultural Trade,  
[www.ers.usda.gov/briefing/agtrade/](http://www.ers.usda.gov/briefing/agtrade/)



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## Healthy Restaurant Destination? Just Think Twice

Which would you choose if you wanted a healthy meal—a fast food or full-service restaurant? Recent survey results show that consumers with less diet and health knowledge tend to choose a full-service restaurant, while those with more knowledge are just as likely to choose a fast food restaurant.

When making choices about where and how often to eat out, U.S. consumers balance a number of sometimes competing desires. Consumers search not only for low prices, but also for taste, convenience, entertainment, and nutrition when deciding where to eat. An ERS analysis of a 2002 consumer survey conducted by Rutgers University finds that respondents who were more willing to forgo other food attributes for convenience were about 8 percent more likely to dine out at least every few days. Respondents citing convenience as the main factor influencing their away-from-home food choices were 17 percent more likely to purchase fast food than were respondents who did not place a premium on convenience.

Survey respondents looking for healthful foods were 19 percent more likely to patronize full-service restaurants (eating places with wait staff) than fast food outlets. This type of rule-of-thumb decisionmaking—in this case, methodical avoidance of fast food—can be a result of limited information. Market research shows that consumers often develop decision rules to compensate for an inability to gather or understand more nuanced information.

In fact, meals and snacks consumed at full-service restaurants are not necessarily nutritionally superior to meals purchased at fast food restaurants. Compared with fast food meals, full-service meals tend to be higher in fat, cholesterol, and sodium, though lower in saturated fats. Both types of eating places offer healthful food choices. Survey analysis suggests that respondents with better diet-health knowledge recognize this. When looking for healthful food, they are equally likely to eat at fast food or full-service restaurants. This sug-



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gests that informed consumers are better able to navigate the away-from-home market, while less knowledgeable ones live by rules of thumb that can be inaccurate. **W**

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### This finding is drawn from . . .

*Let's Eat Out: Americans Weigh Taste, Convenience, and Nutrition*, by Hayden Stewart, Noel Blisard, and Dean Jolliffe, EIB-19, USDA, Economic Research Service, October 2006, available at: [www.ers.usda.gov/publications/eib19/](http://www.ers.usda.gov/publications/eib19/)

The Food Service Chapter of the ERS Briefing Room on Food Market Structures, [www.ers.usda.gov/briefing/foodmarketstructures/foodservice.asp](http://www.ers.usda.gov/briefing/foodmarketstructures/foodservice.asp)

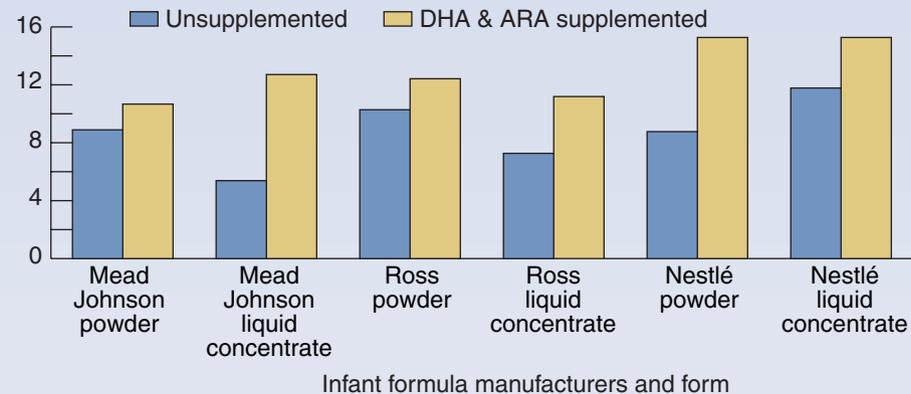
## Cost of Infant Formula for the WIC Program Rising

Over half of all infant formula sold in the U.S. is purchased through the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). An ERS study, the first to consider the impact of retail prices on WIC costs, finds that the cost of providing infant formula has increased in recent years. Since WIC is a discretionary program with fixed funding, this trend, if sustained, means that additional funds will be needed to maintain the level of services or that fewer low-income infants, young children, and women will be served.

Federal law requires that WIC State agencies enter into cost-containment contracts with infant formula manufacturers. Contracts are awarded to the manufacturer offering the lowest net wholesale price—the manufacturer's wholesale price minus a rebate or discount provided by the man-

### Retail markups for supplemented infant formulas exceed those for unsupplemented formulas

Retail markup as a percentage of retail price, 2nd quarter 2004



Source: Analysis by USDA, Economic Research Service of ACNielsen Scantrack data.

ufacturer. In exchange for the rebate, the manufacturer receives an exclusive sales arrangement within the State: WIC participants in the State are given vouchers that can be redeemed in authorized retail food stores only for that brand of formula.

The cost of infant formula to WIC has two components: (1) the net wholesale price—the payment ultimately received by the manufacturer; and (2) the retail markup—the retail price of the formula minus its wholesale price. Supermarket scanner data indicate that, for most States, the retail markup accounts for about 60 percent of the total cost to WIC. The size of the markup relative to the net wholesale price is largely due to the effectiveness of the rebate program. Rebates as a percentage of the wholesale price have ranged from 65 to 98 percent since 1998. In other words, infant formula purchased through WIC has cost States only 2 to 35 percent of its wholesale price, plus the retail markup.

This analysis suggests that both net wholesale price and retail markup have increased over time. However, much of

the increase in costs is due to higher prices for infant formula supplemented with DHA and ARA (two fatty acids found in breast milk); these supplemented formulas average a much greater retail markup than unsupplemented formulas. DHA- and ARA-supplemented formulas were first introduced in 2002, and by mid-2004 they accounted for almost two-thirds of total dollar sales of formula in supermarkets. Often, "new and improved" products carry price premiums that disappear over time. It is possible that the retail markups observed in this study for the supplemented formulas may lessen over time as well.  $\mathbb{W}$

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**This finding is drawn from ...**

*Recent Trends and Economic Issues in the WIC Infant Formula Rebate Program*, by Victor Oliveira and David Davis, ERR-22, USDA, Economic Research Service, August 2006, available at: [www.ers.usda.gov/publications/err22/](http://www.ers.usda.gov/publications/err22/)



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## Agriculture Dominates Freshwater Use in the U.S.

Irrigation made the desert bloom in the West and improved crop alternatives in the East. The less than 20 percent of cropland that is irrigated produces almost half of all crop sales. But this intensive, high-yielding agriculture takes many inputs—fertilizer, chemicals, management, and, especially, water.

Agriculture accounted for over 80 percent of the Nation's consumptive water use over 1960-95—greater than any other sector, both in total and as a share of water

withdrawn. Water use can be measured in terms of withdrawals (total water withdrawn from the environment) or consumptive use—the difference between withdrawals and the amount of water returned through return flows and runoff. While the thermoelectric sector withdraws almost as much freshwater as agriculture (152 versus 159 million acre-feet in 2000), most water diverted to cool thermoelectric power plants is returned to lakes, rivers, and streams. On the other hand, most agricultural water use is for irrigation, and that water is mostly taken up by crops, with relatively little returning to the immediate

water environment (streams and aquifers) for reuse.

Most agricultural water withdrawals occur in the arid Western States where irrigated production is concentrated. In 2000, about 85 percent of total agricultural withdrawals occurred in a 19-State area encompassing the Plains, Mountain, and Pacific regions. In the Mountain region, over 90 percent of the water withdrawn is used by agriculture, almost all (96 percent) for irrigation. Nationally, irrigation is the dominant agricultural water use, but water withdrawn for livestock and aquaculture production (including fish hatcheries) accounts for almost 20 percent of withdrawals in the North-Central and Eastern States. Even in these more humid States, irrigation is the dominant agricultural water use.

Whether water is returned to streams and aquifers or not, water losses, runoff, return flows, and groundwater recharge can have varying effects on the environment. For example, water that is diverted for cooling purposes is typically returned at a higher temperature, which may harm the environment. Environmental impacts can occur from surface-water withdrawals that reduce streamflow. In areas where streamflow is limited, it is usually also needed for riparian systems, fish habitat, groundwater recharge, wetlands preservation, and other extractive uses. When groundwater withdrawals exceed natural rates of aquifer recharge, environmental consequences of groundwater extraction can include land subsidence and reduced flow from natural springs, which reduces surface-water availability.  $\mathcal{W}$

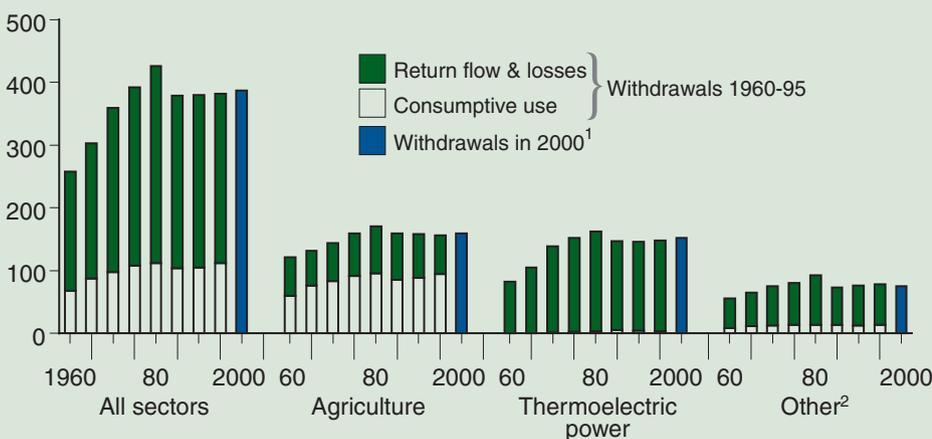
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**This finding is drawn from . . .**

"Chapter 2.1: Irrigation Resources and Water Costs," by Noel Gollehon and William Quinby, in *AREI 2006*, EIB-16, July 2006, USDA, Economic Research Service, available at: [www.ers.usda.gov/publications/arei/eib16/chapter2/2.1/](http://www.ers.usda.gov/publications/arei/eib16/chapter2/2.1/)

### Water withdrawals have levelled off in recent decades

Million acre-feet per year



<sup>1</sup>Data limitations do not allow estimation of consumptive use in 2000.

<sup>2</sup>Includes public supplies, domestic supplies, and industry, except thermoelectric power.

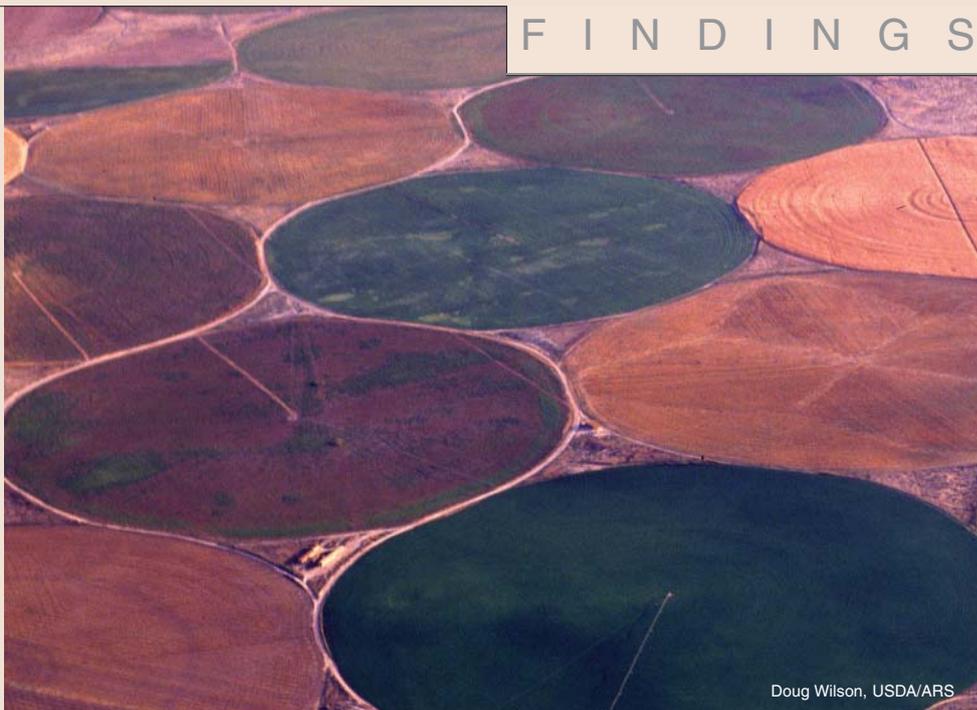
Source: USDA, Economic Research Service.

## Irrigated Acres Up, Water Application Rate Trending Down

Why do farmers irrigate? The benefits of irrigation include higher yields with increased drought protection, more cropping alternatives, reduced frost damage, higher quality products, and increased income stability. Nationally, irrigated corn yields are 30 percent greater than nonirrigated corn. Yield increases average over 60 percent for other field crops, yet the most valued contribution of irrigation is its use on vegetables, orchards, and horticultural crops.

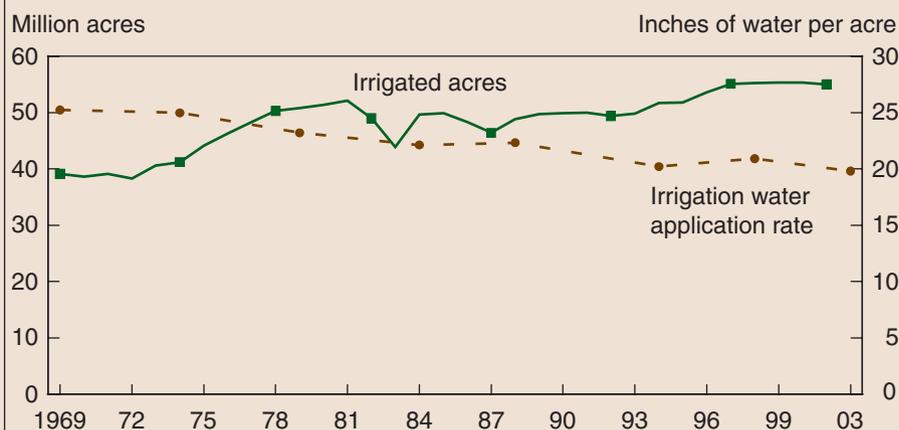
In 2002, U.S. irrigated farmland occupied 55.3 million acres, down 1 million acres from 1997. In recent years, national irrigated area has stabilized at about 55 million acres as continuing growth in Eastern States has been offset by declines in Western States. Variations within the decades-long trend of increasing irrigated acres can largely be explained by year-to-year changes in four factors: farm program requirements, crop prices, water supplies in the West, and weather influences on the need for supplementary irrigation in humid areas. In general, there is an increasing reliance on irrigation in the humid East, with large concentrations of irrigation emerging in Florida, Georgia, and, especially, the Mississippi Delta, primarily Arkansas and Mississippi.

Changes in total water withdrawals for irrigation reflect per acre efficiency gains, shifts in crop locations, and changes in acres irrigated. Averaged over all States and crops, the average water application rate has declined by over 5 inches (about 20 percent) since 1969, to levels below 20 inches per acre in 2003. Producers have adopted more water-conserving practices and shifted production of some commodities to more humid and cooler areas, requiring less supplementary water. Irrigation application rates can vary from less than 6 inches per acre (sorghum in the North-Central



Doug Wilson, USDA/ARS

### Trends in acres irrigated and water application rate from 1969 to 2003



Source: USDA, Census of Agriculture and Farm and Ranch Irrigation Surveys, various years. Variation between Census of Agriculture years based on ERS estimates.

States) to more than 4.5 feet per acre (orchards in the Mountain States). Per acre declines in application rates have partially offset the need for water to supply the increase in irrigated acreage. Over the 1969-2003 period, irrigated acreage increased by over 40 percent while total water applied increased by only 11 percent.

Irrigated agriculture is likely to remain important both as a demand on water resources and as a land cultivation practice. However, continued changes in the irrigation sector are anticipated in response to increasing water demands for urban and

environmental uses, as well as evolving institutions governing farm programs and water allocations. Water withdrawals for agricultural production will likely continue to decline, with at least some portion shifted to satisfy alternative goals.  $\mathbb{W}$

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**This finding is drawn from ...**

"Chapter 2.1: Irrigation Resources and Water Costs," by Noel Gollehon and William Quinby, in *AREI 2006*, EIB-16, July 2006. USDA, Economic Research Service, available at: [www.ers.usda.gov/publications/arei/eib16/chapter2/2.1/](http://www.ers.usda.gov/publications/arei/eib16/chapter2/2.1/)

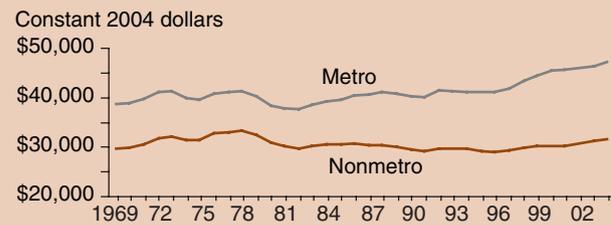
## Nonmetro Earnings Lag Metro

Nonmetro earnings per job are an important indicator of how the rural economy is performing. In 2004, average earnings per nonfarm job in nonmetro areas were \$31,582, versus \$47,162 in metro areas. This gap is longstanding, and widening. Nonmetro earnings were 81 percent of metro earnings in 1979 but dropped to 67 percent by 2004.

Nonmetro earnings trail metro across all nonfarm industries. And a greater portion of metro jobs are in higher paying industries. In 2004, industry sectors with the greatest concentrations of higher paid, college-educated workers posted the largest shortfalls in nonfarm earnings per job. Nonmetro earnings in the finance and insurance sector, for instance, were 43 percent of metro earnings, information services earnings were 45.5 percent, and professional technical industry earnings were 49.7 percent. Earnings were more comparable in nonmetro transportation and warehousing (79.6 percent of metro), retail trade (74.6 percent), and accommodations/foodservice (73.1 percent).

Metro areas often have higher proportions of skilled, higher paid workers within industries, as well. In 2005, the proportion of nonmetro workers in higher paying professional and managerial occupations was 9.3 percentage points less than in metro

## Earnings per nonfarm job, 1969-2004



Source: Analysis by USDA, Economic Research Service of Regional Economic Information System (REIS) data from the Bureau of Economic Analysis.

areas. At the same time, a greater share of nonmetro employment is in lower paying blue-collar occupations.

The higher proportion of nonmetro part-time and multiple job holders also helps explain the metro-nonmetro earnings difference. About 18.3 percent of nonmetro workers held part-time jobs in the first half of 2006, versus 17.2 percent of metro workers. In addition, about 6.1 percent of nonmetro workers held more than one job, compared with 5 percent of metro workers.

Finally, greater distance from metro centers is associated with lower earnings and fewer job opportunities for educated workers. Access to centers of information, communication,

## Reclassification of Nonmetro Areas Exaggerates Employment Gap

Population growth has occurred in a number of nonmetro counties because they are on the edges of established metro areas or are centered on smaller but growing urban areas. After each decennial census, these population shifts cause some nonmetro counties to be reclassified as metropolitan. Metro areas that lose population are reclassified as nonmetropolitan much less frequently, primarily as a result of changes in metro area reclassification rules (see "Behind the Data," *Amber Waves*, September 2003). The net result of these changes is that the area classified as nonmetropolitan becomes slightly smaller after each census, and many of the fastest growing nonmetro counties are reclassified as metro.

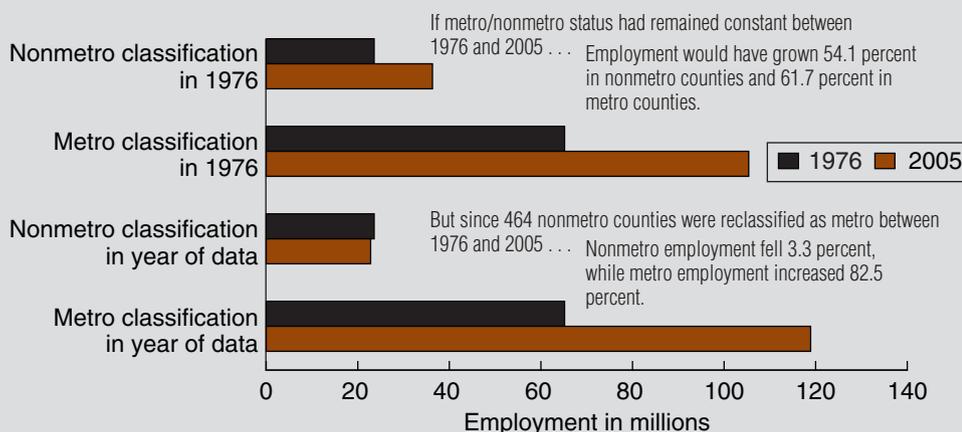
This reclassification can affect employment statistics, exaggerating the contrast in metro-nonmetro economic growth. In fact, the apparent decline of nonmetro employment and most of the evident gap between metro and nonmetro growth rates reflect the reclassification of nonmetro counties as metro.

For example, employment in America's nonmetro counties fell 3.3 percent between 1976 and 2005 to 22.8 million. Because total U.S. employment grew nearly 60 percent in that span, nonmetro's share declined from 26.6 percent to 16.1 percent. Meanwhile, metro employment jumped 82.5 percent to 118.9 million and the metro share of total U.S. employment rose from 73.4 to 83.9 percent.

To understand the impact of reclassification, consider the 2,486 counties classified as nonmetro in 1976. By 2005, employment in these counties had grown 54.1 percent to 36.3 million, and they accounted for 25.6 percent of total U.S. employment, just 1 percentage point below the corresponding value for 1976. Thus, comparing growth rates based on 1976 metro status reveals a relatively modest disparity between the experience of metro and nonmetro counties.

However, the 2000 census reclassified 464 nonmetro counties as metro, which changes the employment picture. Employment in these "new" metro counties increased 92.8 percent

### Metro/nonmetro reclassification changes the apparent employment picture



Source: Analysis by USDA, Economic Research Service of Bureau of Labor Statistics data.



Rubberball

trade, and finance enable a smaller economy to connect to national and international marketplaces. In nonmetro counties with an urban population between 10,000 and 49,999, earnings per job were 69 percent of metro, compared with 61.4 percent in nonmetro counties of less than 10,000.

Lower earnings, however, do not necessarily indicate that rural residents are worse off than their metro counterparts. The cost of living varies with geography, and nonmetro areas typically have lower costs than metro. For more information, see, "Adjusting for Living Costs Can Change Who Is Considered Poor" (pages 10-15). **W**

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**This finding is drawn from . . .**

The Nonfarm Earnings chapter of the ERS Briefing Room on Rural Income, Poverty, and Welfare, [www.ers.usda.gov/briefing/income-povertywelfare/nonfarmearnings/](http://www.ers.usda.gov/briefing/income-povertywelfare/nonfarmearnings/)

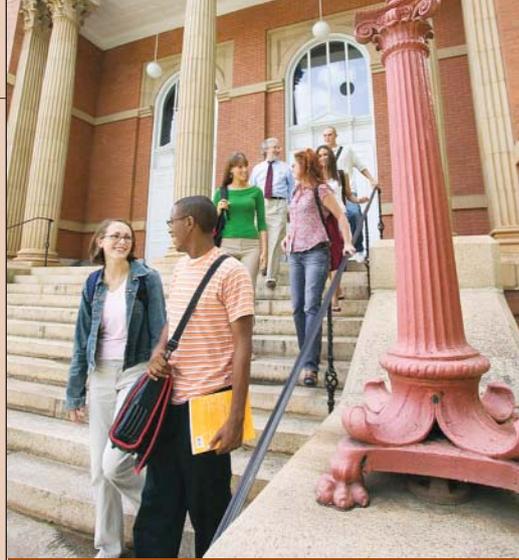
from 1976 to 2005, compared with 36.5 percent in the 2,022 counties that remained nonmetro. At the same time, employment in the 625 counties that remained metro from 1976 to 2005 grew 61.7 percent to 104.7 million. The reclassified counties represented more than 30 percent of the nonmetro employment base in 1976.

Even if the expansion of metro areas continues, the current nonmetro counties likely will still account for something close to their present share of national employment 30 years from now when growth rates are compared based on 2005 metro status. However, a disproportionate number of the fastest growing among these counties will be reclassified as metro, and statistically speaking, the remaining nonmetro counties' share of national employment will decline even further. **W**

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**This finding is drawn from . . .**

The ERS Briefing Room on Measuring Rurality, [www.ers.usda.gov/briefing/rurality/](http://www.ers.usda.gov/briefing/rurality/)



## Designing an Effective Rural Development Strategy

Technological change and the shift to a more competitive global economy have reduced employment in farming and many other rural-oriented industries. To help rural communities adjust, Federal, State, and local governments have invested in improved education, training, and infrastructure, and provided other valuable assistance. But without a good local plan or strategy, these investments are often unsuccessful.

Most rural development experts argue for an inclusive, local strategy-building process that proposes ways to build on community strengths and shore up weaknesses. A community's strengths may include an education system that produces a highly skilled labor force or natural amenities that attract tourists and future residents. Local weaknesses may include inadequate infrastructure, lack of a highly skilled workforce, or a housing shortage.

A collaborative effort using an entire region's assets may be required to help a locality improve access to community colleges, airports, amenity attractions, and telecommunications. Successful economic development strategies pay attention to market trends when identifying economic niches where the locality can have a comparative advantage. For instance, some communities may find it economically feasible to focus on developing value-added food

processors, particularly if raw inputs are plentiful, demand for the industry's output is significant and rising, and transportation links and other business location factors match the industry's needs. These "niche" strategies try to foster the growth of industries with desirable qualities, such as high wages and long-term growth potential.

Effective development strategies also aim for economic diversification, so the community is less subject to fluctuations associated with one or two industries. A focus on entrepreneurship and small business development can be particularly helpful.

Local strategies will vary. For example, agricultural or manufacturing areas may focus more on improving education and training, upgrading Internet connections, and finding new niches—such as alternative energy production—to encourage renewed growth. In contrast, rapidly growing communities may pursue policies aimed at managing growth to make it more sustainable and amenable to local quality of life.

Regardless of the local situation, effective development strategies recognize the importance of community development, including improved housing and health, and reduced crime and poverty. Such activities share the gains from economic development with those who might otherwise not benefit and boost local support for the strategy. Community development also helps attract people and industry to the community, since many consider noneconomic factors in their decisions to relocate. **W**

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**This finding is drawn from . . .**

The ERS Briefing Room on Rural Development Strategies, [www.ers.usda.gov/briefing/ruraldevelopment/](http://www.ers.usda.gov/briefing/ruraldevelopment/)

Eyewire

# Adjusting for Living Costs Can Change Who Is Considered Poor

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NOVEMBER 2006

11

AMBER WAVES

- The prevalence of poverty has been greater in nonmetro than metro areas in every year since the 1960s when poverty rates were first officially recorded.
- Adjusting the official poverty measure for cost-of-living differences reverses the rankings of metro and nonmetro poverty.
- Such a reversal could have important implications for the geographic and demographic distribution of Federal funding of poverty-based programs.

An author interview is featured online at:  
[www.ers.usda.gov/amberwaves/](http://www.ers.usda.gov/amberwaves/)

In 1960, the Census Bureau began recording poverty rates by area of residence across the U.S. Every year since then, the prevalence of poverty has been greater in nonmetropolitan (nonmetro) areas than in metropolitan (metro) areas. During the late 1960s, poverty in nonmetro areas was almost twice as high as in metro areas. This difference declined over time, and by the 1990s, the nonmetro poverty rate was between 12 and 30 percent higher than the metro rate. In 2003, 12.1 percent of the metro population was poor, while the poverty rate for nonmetro areas was 14.2 percent.

Poverty estimates figure prominently in the distribution of Federal and State assistance funds. More than 25 different Federal assistance programs link their eligibility criteria in part to poverty lines or rates. Given the higher rates of nonmetro poverty and the link between program eli-

gibility and poverty, it follows that more Federal assistance funds per capita are distributed in nonmetro areas. For example, to receive food stamps, a household's income must be equal to or less than 130 percent of the poverty line. In 2004, the Food Stamp Program distributed more than \$24 billion in program benefits, and Current Population Survey data indicate that per capita benefits were 32 percent higher in nonmetro areas than metro areas. Overall, in 2001, the per capita distribution of Federal funds for income security programs was 17 percent higher in nonmetro than in metro areas.

The National Academy of Sciences has recommended several changes in how the Federal Government measures poverty. ERS examined one of these recommendations—adjusting for geographic differences in the cost of living—and found that such an adjustment would change the geo-

## How the Index Is Constructed

The cost-of-living index uses 2001 Fair Market Rent data, which are collected by HUD to determine eligibility of rental housing units for the Section 8 Housing Assistance Payments program. FMR data estimate the cost of rent plus utilities at the 40th percentile of reported rental expenditures for standard-quality housing.

The index assumes that differences in Fair Market Rents across the U.S. reflect variation in the cost of shelter for low-income families. But people need other goods besides shelter, and the cost-of-living index accounts for these needs by assuming that housing consumes 44 percent of expenditures for a low-income family and that all other goods consume the remaining 56 percent. The costs of these other goods are assumed not to vary across the U.S. The resulting index estimates differences in the cost of living across the U.S. by taking a weighted average of FMR (with a weight of 44 percent) and all other goods, which are assumed not to vary in costs.

Just how accurately does the index portray cost-of-living differences? We don't know, but we can examine whether the findings hold if we were to change some of the assumptions. One concern is that the cost-of-living index assumes that prices of all goods and services, other than housing, do not vary geographically. This assumption is unlikely to be accurate, but the U.S. has no national price index to measure cost-of-living differences across areas to correct it.

State-level analysis suggests that the prices of housing and all other goods are positively correlated. Or, in other words, counties with high housing costs also tend to be counties with high costs for other goods and services. If this positive correlation is true at the national level, then the reversal of the poverty rankings reported here would be amplified. Adjusted nonmetro poverty rates would drop and metro poverty rates would increase by even more than the rates presented here. Alternatively, assuming that areas with high costs of housing are areas with low costs in all other goods would weaken the findings. But the negative correlation between housing costs and costs of all other goods would have to be large (i.e., a coefficient of correlation greater in magnitude than 0.2) for the findings to disappear.

Another concern is that the assumption that the cost of shelter plus utilities makes up 44 percent of the budget for a poor person might overstate housing expenses. If we maintain the assumption of no variation in the cost of nonhousing goods but reduce the share of the index for housing costs, then geographic variation in the cost of living would be dampened. The change in the budget share for housing, though, would have to drop below 33 percent before the reversal of the metro and nonmetro poverty rankings would no longer hold.

graphic distribution of poverty. Currently, the official Federal poverty thresholds assume that the cost of living is the same over the entire U.S. However, the Census Bureau has developed experimental poverty measures that use rent data to create an index for geographic differences in the cost of living. Using this index to adjust for differences in the cost of living reverses the ranking of metro and nonmetro poverty.

## Cost of Living Varies Geographically

The major components of a low-income household's budget are housing, food, transportation, and health care. The purpose of many assistance programs is to boost the purchasing power of needy Americans so they can purchase basic necessities and attain a minimum standard of living. The cost of purchasing many of the basic necessities—the cost of living—varies across the U.S. For Federal assistance programs to boost the purchasing power of program participants by similar amounts, regardless of where they live, it is necessary to account for cost-of-living differences.

The Census Bureau has developed a geographic cost-of-living index based on 2001 Fair Market Rent (FMR) data collected by the U.S. Department of Housing and Urban Development (HUD). FMR data provide full coverage of the U.S., including metro and nonmetro areas, and they reflect the costs of rent and utilities faced by lower income households (see box, "How the Index Is Constructed"). HUD produces annual estimates for 354 metro areas and 2,350 nonmetro counties. The cost-of-living index aggregates the FMR estimates to 100 different price levels, one for metro and one for nonmetro counties of each State plus the District of Columbia (NJ and DC have no nonmetro areas). For the index, metro counties are defined as any county that (1) contains a city with a population of at least 50,000, (2) has an urbanized area as defined by the Census Bureau, or (3) is adjacent to and economically tied to a metropolitan area.

The cost-of-living index is based on data from 2001 and consists of two components—housing and all other goods and services. The index assumes that variation in the FMR data across the U.S. reflects variation in housing costs for the poor. It also assumes that the prices of all other goods and services do not vary (see box, "What the Index Does Not Measure"). Housing is a critical component of the index because it is both the largest budget item for poor families and the most important source of cost-of-living differences in the U.S. Following the recommendations of the National Academy of Sciences, the index assigns a weight of 44 percent for housing expenses and 56 percent for all other goods and services. If the FMR data indicate that rents in a particular area are 10 percent higher than the baseline, then the cost of living in this area is assumed to be 4.4 percent higher than the baseline.

## Adjusting for Living Costs Reverses Poverty Rates

The data used in this article are the 2001 cost-of-living index and the 1992-2003 March Supplement to the Current Population Survey (CPS). CPS data are the basis for the official U.S. poverty estimates and, in more recent years, provide information on more than 80,000 families in each year. The sample represents the civilian, noninstitutionalized population and members of the Armed Forces living either off base or with their families on base. The reference period for income-related questions is the preceding calendar year; there-

fore, the 1992-2003 CPS data provide poverty estimates for 1991 through 2002.

Income, following the Federal definition of poverty, includes all pre-tax income but does not include capital gains or noncash benefits, such as public housing, Medicaid, or food stamps. A person is poor if this measure of income is less than thresholds set by the U.S. Government. Poverty thresholds account for differences in need by setting different thresholds for families of varying sizes. So, for example, in 2001, a three-person family consisting of two adults and one child was poor if its family income was less than \$14,255.

One way to account for cost-of-living differences is to adjust the poverty threshold by the cost-of-living index. For example, the index for metro Illinois is 1.08, which means that the three-person family threshold of \$14,255 would be increased by 8 percent to \$15,395. The index for nonmetro Florida is 0.90 which means that the three-person poverty threshold would decline to \$12,830.

Following the official definition of poverty, 11.1 percent of the metro population was poor in 2001. For nonmetro areas, the poverty rate was 14.2 percent—about 28 percent higher. Once the poverty

### What the Index Does Not Measure

After housing, food and transportation are the next largest expenses, each taking about 15 percent of a poor family's budget. The 2001 cost-of-living index assumes no variation across metro and nonmetro areas in food and transportation costs, but ERS research indicates otherwise.

Households in nonmetropolitan areas report that they can, on average, meet their basic food needs at a lower cost than similar households in metropolitan areas can. Using nationally representative data from the CPS Food Security Supplements on how much households say they would need to spend just to meet their food needs, ERS researchers developed and assessed cost-of-enough-food indexes for 470 geographic areas. At the national level, the research showed that, on average, the cost of enough food is between 11 and 14 percent less for nonmetro households than for otherwise similar households in metro areas. Costs for nonmetro households vary considerably across States.

In contrast, evidence suggests that nonmetro residents face higher transportation costs than individuals living in metro areas. Slightly less than one-third of transportation costs for a poor family consist of expenditures on gasoline. According to data from the Census Bureau and the U.S. Department of Energy, rural households with vehicles consumed nearly 40 percent more gasoline and drove almost a third more vehicle-miles than urban households in 2001. Rural residential vehicles also tend to be less fuel efficient than their urban counterparts—averaging 19.5 vs. 20.5 miles per gallon in 2001. Nonmetro counties located near major metro areas and those located in mountainous areas, such as in Appalachia, have among the longest commutes in America.



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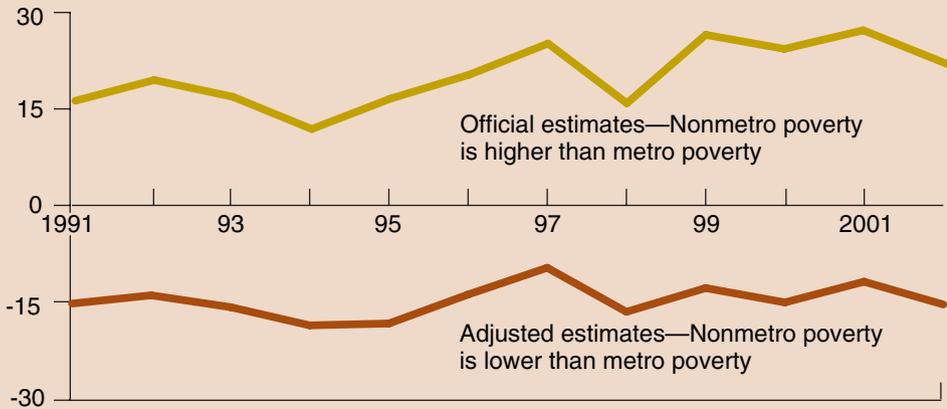
Public transportation may help to meet the mobility needs of carless individuals and can also help to offset the higher transportation costs of nonmetro areas. However, significant gaps exist in the nonmetro transit network, with about 4 out of 10 nonmetro counties having no public transportation services at all, according to the Community Transportation Association of America. Even in nonmetro counties offering transit service, 28 percent offer only limited service (less than 25 trips taken each year per carless household). Lack of access to public transportation can force residents to rely on costlier taxi services.

While the cost-of-enough-food indexes suggest that the 2001 cost-of-living index understates nonmetro-metro differences in living costs, evidence on transportation costs suggests that the index overstates differences. The size of the bias in the index from ignoring differences in transportation costs is about the same as from ignoring differences in food costs, which suggests that the net effect is small. With housing accounting for more than twice the budget share of either food or transportation, the small net effect is unlikely to alter this article's findings.

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### Cost-of-living adjustment reverses poverty rankings

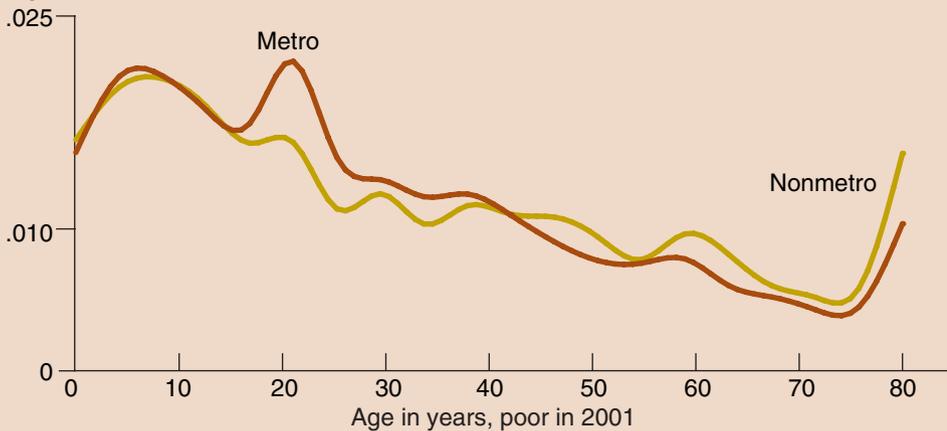
Percent difference between nonmetro and metro poverty rates



Source: Current Population Survey, 1992-2003.

### The nonmetro poor are older than the metro poor

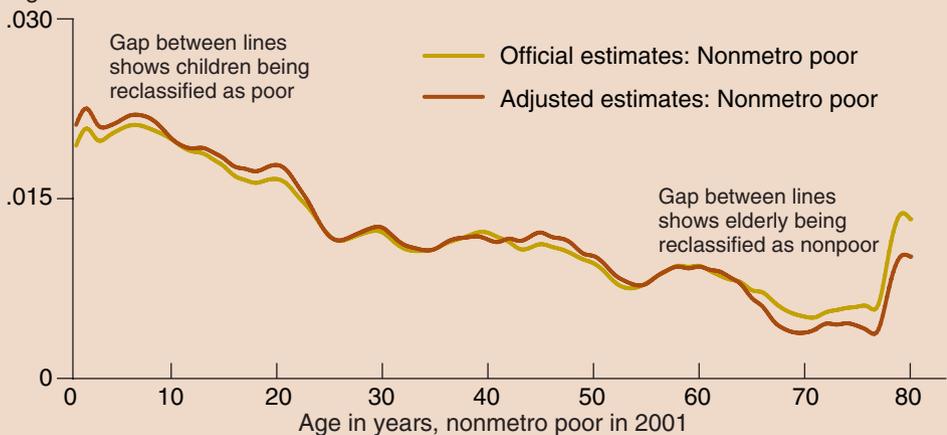
Age distribution



Source: Current Population Survey, 2002.

### Cost-of-living adjustments change the age composition of the nonmetro poor

Age distribution



Source: Current Population Survey, 2002.

thresholds are adjusted using the cost-of-living index, this ranking reverses. The adjusted nonmetro poverty rate drops to 10.5 percent, and the adjusted metro rate increases to 12.0 percent. Where the official poverty rate indicates that the incidence of poverty is 28 percent higher in nonmetro areas, the poverty rate that is adjusted for cost-of-living differences suggests that the incidence of poverty is 12 percent lower in nonmetro areas.

The reversal of poverty rankings is not unique to 2001. Using the 2001 cost-of-living index for multiple years indicates that the reversal holds for every year considered (1991-2002). The use of the 2001 index assumes that the geographic variation in prices over the last decade has been somewhat stable. (This assumption is found to be reasonable from examining earlier years of FMR data.) In most of the years considered, the official nonmetro poverty rate has been more than 15 percent higher than the metro poverty rate. When adjusted for cost-of-living differences, the nonmetro poverty estimates are 10-25 percent less than the metro estimates.

### Nonmetro Elderly Affected the Most

Previous research indicates that the nonmetro poor are somewhat older on average and more likely to be retired, while the metro poor are younger and more likely to be going to school. In 2001, the average age of the poor living in nonmetro areas was about 2 years greater than that of the metro poor. Similarly, 25 percent of the nonmetro poor were age 50 or older, compared with 20 percent of the metro poor.

In 2001, child poverty rates were higher in both metro and nonmetro areas than the poverty rates for other age groups. Children also comprised a greater share of the population of poor people in both metro and nonmetro areas.



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Differences in the age distribution of the poor across metro and nonmetro areas are seen in adults. A greater share of the metro poor falls in the age range of 18-40 years, while more of the nonmetro poor are middle-aged and elderly.

Adjusting for cost-of-living differences had a larger effect on the age composition of the nonmetro poor than the metro poor. A greater proportion of the nonmetro poor who are reclassified as nonpoor following the cost-of-living adjustment (those with incomes just below the poverty line) are older people. Forty-two percent of the nonmetro poor who are reclassified as nonpoor are over 40 years old. Among the metro poor, 33 percent of those reclassified as nonpoor are over 40.

### Adjustment in Poverty Measures Could Shift Program Funds

With no adjustment for cost-of-living differences, the prevalence of poverty is consistently higher in nonmetro than in metro areas. When the index is used to adjust for cost-of-living differences, poverty is higher in metro than in nonmetro areas. The adjustments would reduce the nonmetro poverty population in 2001 (and increase the metro poverty



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population) by 1.9 million people. Given the large number of Federal assistance programs that tie eligibility criteria to poverty, adjusting the official definition of poverty to incorporate cost-of-living differences could have important implications for the distribution of Federal funds. In particular, one would expect to see more funds targeted to people living in metro areas and fewer funds targeted to nonmetro areas.

Adjusting for cost-of-living differences would also change the demographics of poverty. Currently, the nonmetro poor are disproportionately elderly, many of whom are living on fixed incomes near the poverty line. Adjusting for differences in the cost of living would result in reclassifying many of these elderly poor as nonpoor. Of the 1.9 million nonmetro poor who would be reclassified as nonpoor, 25 percent are age 60 or older. This adjustment could significantly affect Federal programs, such as Supplemental Security Income, Medicaid, the Child and Adult

Care Food Program, and the Commodity Supplemental Food Program, as the number of elderly who qualify for these programs would be reduced. **W**

#### This article is drawn from ...

*The Cost of Living and the Geographic Distribution of Poverty*, by Dean Jolliffe, ERR-26, USDA, Economic Research Service, September 2006, available at: [www.ers.usda.gov/publications/err26/](http://www.ers.usda.gov/publications/err26/)

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The ERS Briefing Room on Rural Income, Poverty, and Welfare, available at: [www.ers.usda.gov/briefing/incomepovertywelfare/](http://www.ers.usda.gov/briefing/incomepovertywelfare/)

A complete listing of the Federal poverty thresholds is available at: [www.census.gov/hhes/www/poverty/threshld.html](http://www.census.gov/hhes/www/poverty/threshld.html).



# Food Safety Improvements Underway in China

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- Adverse publicity about contaminated food exports and growing domestic concerns have prompted China to improve overall food safety.
- Producing safer food for export is expensive and reduces China's cost advantage.
- Only a small portion of Chinese production for the domestic market meets the new government standards for safer food.

China emerged in the 1990s as a low-cost exporter of food products such as vegetables, apples, seafood, and poultry. But in recent years, China's exports slowed when shipments of vegetables, poultry, and shrimp were rejected for failing to meet stringent standards in Japan, Europe, and other countries, revealing a gap between Chinese and international food safety standards. Problems with food contamination within China have made food safety a top concern of Chinese consumers as well, an issue reflected in recent opinion polls and newspaper articles.

China is in the midst of a campaign to overhaul its food system and improve safety standards. Numerous challenges face both the export sector, where food safety efforts are the most advanced, and the domestic sector, where many food safety initiatives are more recent. Problems with food safety can influence trade flows, as evidenced by China's setbacks for some export products. China must meet the food safety standards of the developed countries to succeed in those markets. The increased costs of achieving higher food standards will dampen the growth of Chinese agricultural exports if not offset by greater demand in the export market. China's efforts are an important case study of a country's striving to elevate standards in its food and agriculture sector to international food safety standards.



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### China Faces Challenges in Providing Safer Food

Implementing a 21st-century food safety system in China poses a challenge. It is difficult to standardize and monitor production practices in a sector composed of 200 million farm households who typically have 1-2 acres of land divided into 4-6 noncontiguous plots. Farmers have only usage rights to their land, so they lack ownership incentives to make costly investments.

Many of China's food safety problems can be traced back to the farm level. Farmers rely on heavy use of chemicals to coax production out of intensively cultivated soils and deal with pest pressures, a practice that contributes to food safety problems. China has one of the world's highest rates of chemical fertilizer use per hectare, and Chinese farmers use many

highly toxic pesticides, including some that are banned in the United States. Farm chemicals are sometimes mislabeled. The Chinese government is tackling this problem by encouraging farmers to buy agricultural chemicals only from approved outlets. Some farmers have little understanding of correct chemical use; for example, they may fail to wait the prescribed number of days between the last application of a pesticide and harvest, resulting in excessive residues in the harvested product. Antibiotics are widely used to control disease in livestock, poultry, and aquaculture products. Industrialization and lax environmental controls have also led to concern about the potential for heavy metal contamination of food products. Untreated human and animal waste in fields and water raises the risk of microbial contamination.

China's fragmented marketing system also poses problems. Agricultural marketing is dominated by millions of small traders handling small volumes of product, often operating on a cash basis, with no documentation. In modern marketing systems, products are identified by lot and traced through the system with a paper trail. This process is easier in the United States than in China, since growers and buyers are fewer in number and deal in larger volumes. Vertical coordination and integration between growers and buyers also makes it easier to produce safe food and control it through the marketing chain. Chinese exporters have tried various approaches to gain greater vertical control over production, and these methods are now being promoted within the Chinese domestic market.

### Successful Export Industries Achieve Safety Standards, but at a Cost

China has emerged as a major exporter of agricultural products based primarily on its low labor costs and openness to foreign investment. Many of its exports are produced by companies with investment from Japan, South Korea, Singapore, Taiwan, and Europe. Most operations involve growing and processing fruit, vegetables, livestock, fish, or shrimp in coastal provinces with easy access to ports.

The influx of foreign investment has also brought foreign technology and attention to food safety. The importance of Japan, in particular, as an export market has compelled Chinese firms exporting to that country to make major improvements in food safety. Successful foreign firms operating in China exert careful control over raw materials to ensure that products meet the standards of the export markets. Exporting companies have been even more vigilant since 2002 when Chinese frozen spinach in Japan was found to have

#### Importers reject contaminated Chinese products

Year	Product	Country	Problem
2001	Shrimp	European Union (EU)	Excessive antibiotic residues
2001	Poultry	EU, Japan	Excessive antibiotic residues
2002	Honey	EU	Excessive antibiotic residues
2002-2003	Frozen spinach	Japan	Excessive pesticide residues
2002	Tea	EU, Japan	Excessive pesticide residues
2005	Fermented cabbage	South Korea	Parasites

Source: News reports compiled by USDA, Economic Research Service.

high levels of a pesticide and imports were banned temporarily (see box, "China's Frozen Spinach Exports to Japan Falter on Food Safety Problems"). New Japanese rules for residues of agricultural chemicals, feed additives, and veterinary drugs, implemented in May 2006, will put further pressure on Chinese exporters.

Firms have used two business models to impose more control over production: the first is a fully vertically integrated model in which the company leases land and controls production directly; the second is the use of production contracts with growers that specify chemical use and production methods. The leasing model ensures greater control over production than the contract model, but it also costs more and is limited by access to land. Developing a production model that balances low costs against the risk of a safety problem is challenging. Exporting firms sometimes use both methods—growing the crops that are most prone to excess pesticide problems, such as leafy greens, on their leased land and using production contracts for other crops.

Leases are typically arranged with village officials who serve as intermediaries to aggregate land into a "production base"—an area that may be as large as multiple villages and hundreds of acres. Leasing land is surprisingly expensive and involves difficult negotiations since there is no formal market for land. Foreign companies often pay rents comparable to those in developed countries. Companies post technical experts onsite to manage production and supervise workers. These firms may test soil, water, and air for pollutants; implement good agricultural practices (GAPs) to reduce the risk of microbial contamination; and use a type of Hazard Analysis and Critical Control Point (HACCP) system to minimize risk in processing plants. A firm selling to a wide range of countries might face numerous stan-

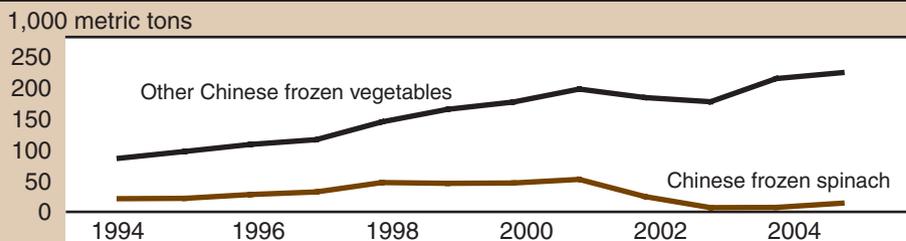
### China's Frozen Spinach Exports to Japan Falter on Food Safety Problems

In the early 1990s, Japanese companies began investing heavily in vegetable production in China for export to Japan. Exports to Japan soared, and frozen spinach was gaining ground rapidly. In late 2001 and 2002, private tests organized by the Japanese National Federation of Farmers' Movements revealed that Chinese frozen spinach showed residues of the pesticide chlorpyrifos. At that time, Japan did not have a maximum residue limit (MRL) for this pesticide on frozen spinach, so it adopted the MRL for fresh spinach. In August 2002, the Japanese Government advised firms to voluntarily stop importing Chinese frozen spinach. This adverse publicity affected imports of all frozen vegetables from China. In February 2003, the market was briefly reopened before new tests revealed continued problems with chlorpyrifos. The market was shut again in May 2003.

China worked out a protocol to meet Japanese concerns and the market reopened in July 2004. Chinese exports were initially limited to 27 firms that the Chinese and Japanese had both approved. Exporting to Japan is now more expensive than it was before the problems with chlorpyrifos. All firms are required to use leased land and cannot use production contracts, which are considered too risky for spinach. Fresh spinach is also tested for residues before harvest, as well as after processing. Japan inspects every lot of Chinese frozen spinach, which increases costs and the chance of product deterioration. While other frozen vegetable exports to Japan have rebounded, the frozen spinach market has not yet recovered. With heightened food safety awareness, some Chinese products may no longer be as profitable as others due to consumer and importer reluctance to purchase products associated with past problems.

Japan's new policy on agricultural chemicals (including veterinary drugs and feed additives) became effective in May 2006. Japan had a negative MRL list, but the new policy uses a positive MRL list. With a negative list, Japan rejected any imports with residues over the existing MRLs. If an import had residues for which Japan did not have an MRL for that commodity, a case-by-case decision was made on whether it could be imported. With a positive list (like the system used in the United States), Japan rejects imported commodities with residues exceeding the MRL or the default tolerance of 0.01 parts per million for those cases where a commodity does not have an MRL for that chemical. In 2005, Japan had established MRLs for 288 agricultural chemicals for about 130 commodities. The new regulations have MRLs for 799 agricultural chemicals and thousands of commodity/chemical combinations. Japan now scrutinizes products for more agricultural chemicals and testing costs have increased substantially since the introduction of the new policy.

### Chinese frozen spinach exports to Japan lag while other frozen vegetable exports rebound



Source: World Trade Atlas.

dards; GAP requirements as well as maximum residue limits (MRLs) for pesticides vary from country to country. The exporting firm may even purchase agricultural chemicals abroad to ensure that they are genuine.

Production contracts are also generally arranged by village officials who recruit farmers. The contract typically specifies inputs, production practices, price guidelines, and minimum environmental standards for air, water, and soil. Contractors must monitor farmers to ensure compliance. With more experience, growers may need less monitoring, and costs may go down. But the contracting model does not burden the company with land and labor expenses.

### China's Government Begins To Tackle Food Safety

Awareness of food safety issues in China has been heightened by both the rejection of exports in overseas markets and a series of food safety incidents in the domestic market. The Government has responded by trying to build a food safety system for exports that will establish China's international reputation for producing safe food. China has also been raising domestic food safety standards and implementing inspection and testing systems for consumer products and agricultural commodities. In 2005, officials announced plans to update a 1995 law covering consumer food products. In 2006, the Chinese legislature adopted a law that establishes a national framework for



and Quarantine is responsible for oversight and food safety standards for imports and exports.

The Ministry of Agriculture is the lead agency promoting food safety at the farm level. The most visible efforts are the promotion of pollution-free (also translated as "no harm" or "safe") and green food standards intended to guarantee that food products are free of dangerous contaminants. The pollution-free standard, introduced in 2002, requires that all products comply with MRLs for agricultural chemicals. The green food program was initiated in the 1990s with an eye toward improving the safety and quality of exports, although most green food is now sold in the domestic market. The green food program is slightly more stringent than the pollution-free program.

building a system that ensures the safety and monitoring of agricultural products. Local governments have also been active in promoting safer food.

All land and packing/processing facilities for exports must be registered with the Chinese Government. Exporters must have laboratory facilities to test for pesticide residues (although the sophistication of the facilities varies with the riskiness of the crop). Certain processed agricultural exports—including canned food, some seafood, meat, frozen vegetables, and fruit and vegetable juices—must be produced using HACCP-type systems. The Government provides basic guidelines on food safety, but most firms must still hire food safety experts to fine-tune their operations to meet the demands of foreign buyers. Before export, the Government tests products to ensure that they meet the standards of the foreign country or contract.

Both programs have standards specifying tolerances for harmful materials in soil, water, and air as well as MRLs for pesticide residues. Both also certify production base areas, and offer trademarked symbols for use on consumer products. Packaged products carry information on the firm, providing a first step in a traceability system. Compliance is enforced by regular testing of soil, water, and air, and random testing of final products for residues.

Food safety for the domestic market is regulated by several government entities. The Ministries of Agriculture, Health, and Commerce; the State Administration of Quality Supervision, Inspection, and Quarantine; a newly established Food and Drug Administration; and other agencies, each with different and sometimes overlapping responsibilities, contribute to food safety policies. The State Administration of Quality Supervision, Inspection,

While production of safer food is increasing, little of China's food currently meets green and pollution-free standards. In 2005, about 6 percent of the volume of agricultural production was pollution free and 1 percent was green.

Chinese food safety efforts at the farm level are primarily concerned with chemical residues; to date, less attention is paid to the potential of microbial contamination. Statistics from China's



Ministry of Health, however, indicate that food poisonings and deaths from microbial contamination exceed those from farm chemical exposure. China is developing good agricultural practice guidelines, ChinaGAPs, which will address minimizing the risk of microbial contamination. Initially, these guidelines are intended to aid exporters.

### Government Plays a Strong Role in Implementation

Chinese consumers now commonly voice concerns about food safety, and various safety-related labels appear on food products. However, the degree of consumer understanding and confidence in food safety labels is uncertain, as is consumers' willingness to pay higher prices for these products. Consumers in China are primarily concerned with freshness, appearance, and taste.

The green and pollution-free standards are implemented in a "top-down" process by the Ministry of Agriculture and local agricultural bureaus working with local officials, villages, and agribusinesses. As in the business model used by exporters, domestic enterprises contract with farmers, using village officials as intermediaries. Some domestic enterprises also control production by leasing land. Some of the vertically integrated enterprises are large, former state farms that have been converted to private compa-

nies, while others are newly established Chinese corporations.

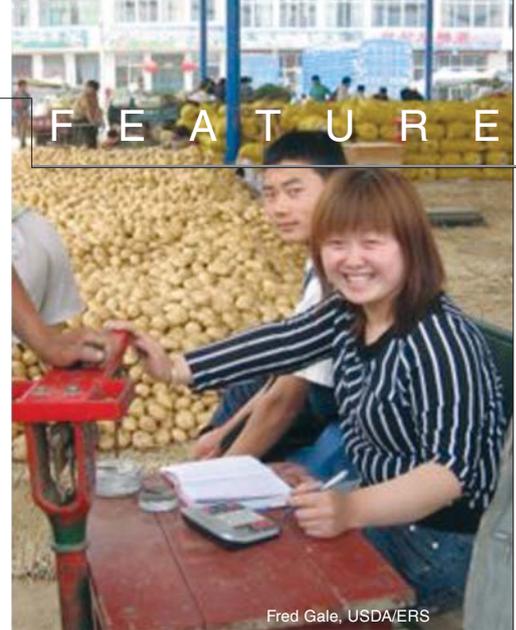
The decision to produce green or pollution-free food is usually made by local officials or agribusiness enterprises rather than individual farmers. It is not clear whether farmers find green or pollution-free food more profitable. Farmers reportedly earn price premiums of 20-30 percent for pollution-free vegetables, but they may also have to purchase more expensive chemicals and incur costs to attain certification.

### Safety Standards Influence China's Agricultural Trade

Foreign safety standards pose an important challenge to China's exports of horticultural, meat, poultry, and aquatic products. Exports of more vulnerable products come chiefly from foreign-invested companies in coastal areas. Widespread pollution, pest and disease pressures, low domestic food safety standards, and the difficulty of ensuring product safety throughout the marketing chain may prevent export-oriented production from expanding to inland provinces and domestic companies.

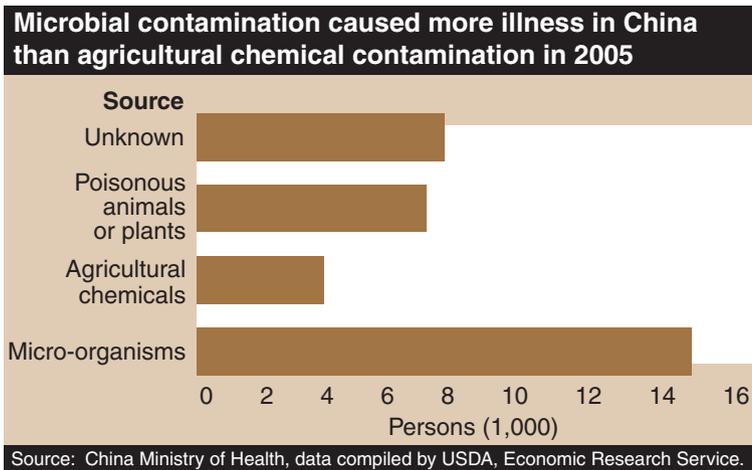
Chinese officials have resolved to improve the quality and safety of food in China. Initial efforts were aimed at export-oriented production, which has traditionally had much higher standards and often completely separate production and mar-

keting chains from products destined for the domestic market. The gap between export and domestic standards is vast although beginning to narrow, but China faces stiff challenges in



Fred Gale, USDA/ERS

producing food to higher safety standards and maintaining a credible inspection and monitoring system. Building consumer confidence in the safety of its food products will largely determine the competitiveness of China in both the world market and its own domestic market. W



This article is drawn from . . .

*China's Rising Fruit and Vegetable Exports Challenge U.S. Industries*, by Sophia Huang and Fred Gale, FTS-320-01, USDA, Economic Research Service, February 2006, available at: [www.ers.usda.gov/publications/fts/feb06/fts32001/](http://www.ers.usda.gov/publications/fts/feb06/fts32001/)

"A New Marketing Model: Supermarket and Processing Companies and Farm Households," by Dinghuan Hu, Fred Gale, and Tom Reardon, in *Issues in Agricultural Economy*, No. 1, 2006 (Chinese language, published in China).

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"Produce, Food Safety, and International Trade: Response to U.S. Foodborne Illness Outbreaks Associated with Imported Produce," by Linda Calvin, in *International Trade and Food Safety*, Jean Buzby (ed.), AER-828, USDA, Economic Research Service, November 2003, available at: [www.ers.usda.gov/publications/aer828/aer828g.pdf](http://www.ers.usda.gov/publications/aer828/aer828g.pdf)  
The ERS Briefing Room on China, [www.ers.usda.gov/briefing/china/](http://www.ers.usda.gov/briefing/china/)

# Managing Risk With Revenue Insurance

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- Crop revenue insurance offers farmers a way to manage revenue variability that results from yield and price risks.
- Commodity-level revenue insurance, particularly for corn, soybeans, and wheat, has become a major part of the subsidized Federal crop insurance program.
- Whole-farm revenue insurance, based on combined revenue from all commodities produced on a farm, is a more broad-based approach, but is difficult to administer.

Farming is an inherently risky business. Uncertain weather conditions, market shifts, and other events beyond a farmer's control affect farm yields and commodity prices, creating variability in farm revenue. Since the early 1980s the Federal Government has promoted insurance as a tool for managing crop losses. In its simplest form, insurance reduces risk by making payments to insured farmers when yields or revenues fall below a guaranteed level. Farmers can choose from a variety of insurance plans in the subsidized Federal crop insurance program, including yield insurance plans, which have been part of the program from the outset, and revenue insurance plans, which were added in the mid-1990s.

As a tool based on revenue shortfalls rather than on yield or price shortfalls, revenue insurance can be more effective at stabilizing income than insurance plans or farm programs that protect against yield and price risks separately or that provide fixed-income transfers. A revenue-based program may also offer a simple way of assisting a wider variety of farms than programs linked to current or historical production of particular commodities, a practice that focuses risk management support only on certain segments of the farm sector. Finally, revenue insurance plans are designed to match costs of risk protection with benefits and to base coverage on the market value of the item insured.

### **What Causes Revenue Variability?**

Revenue depends on production, prices, and interactions between the two. Prices received by farmers depend largely on world market conditions, while yields depend on localized factors, such as weather. Thus, revenue variability across farms is largely the result of yield variability and differences in the relationship between prices and individual farm-level yields.

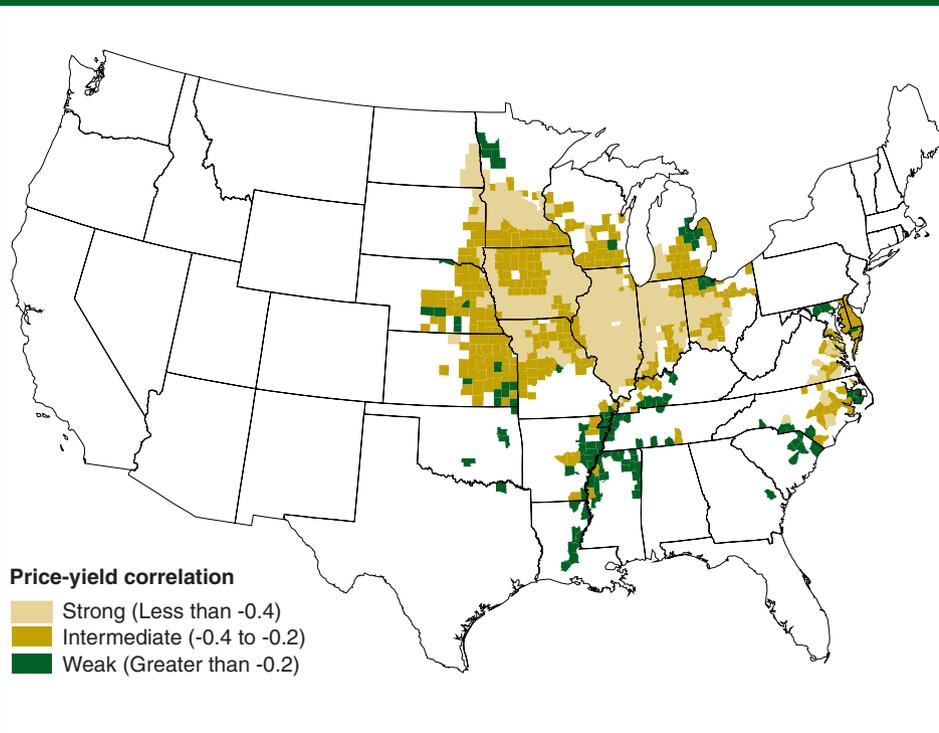
The relationship between prices and yields is "negative" when changes in yield and aggregate production result in offsetting changes in prices. In other words, when yield and aggregate production of a commodity increase, price decreases; when yield falls, price rises. The price-yield relationship, measured by the price-yield correlation, tends to be strongest in areas where most farm-level yields are closely related to areawide production and where the area's production normally accounts for a significant share of world production. Corn and soybeans, for example, show the strongest negative price-yield correlation in the Midwest. Negative price-yield correlations moderate revenue variability, thus they are often referred to as a "natural hedge."

Not surprisingly, many areas with large amounts of corn and soybean production tend to be areas of low yield variability. Yield variability for corn, for example, is low in Illinois and Iowa, which together account for about a third of the U.S. corn crop. The U.S. crop typically accounts for about 40 percent of world production. Because of the low yield variability and the strong price-yield correlations, revenue insurance costs are relatively low in these areas and producers tend to see a correspondence between revenue variability on their farms and the protection offered by revenue insurance. In contrast, for crops in areas with high yield variability and weak price-yield correlation, such as cotton in Texas, revenue insurance costs are higher.

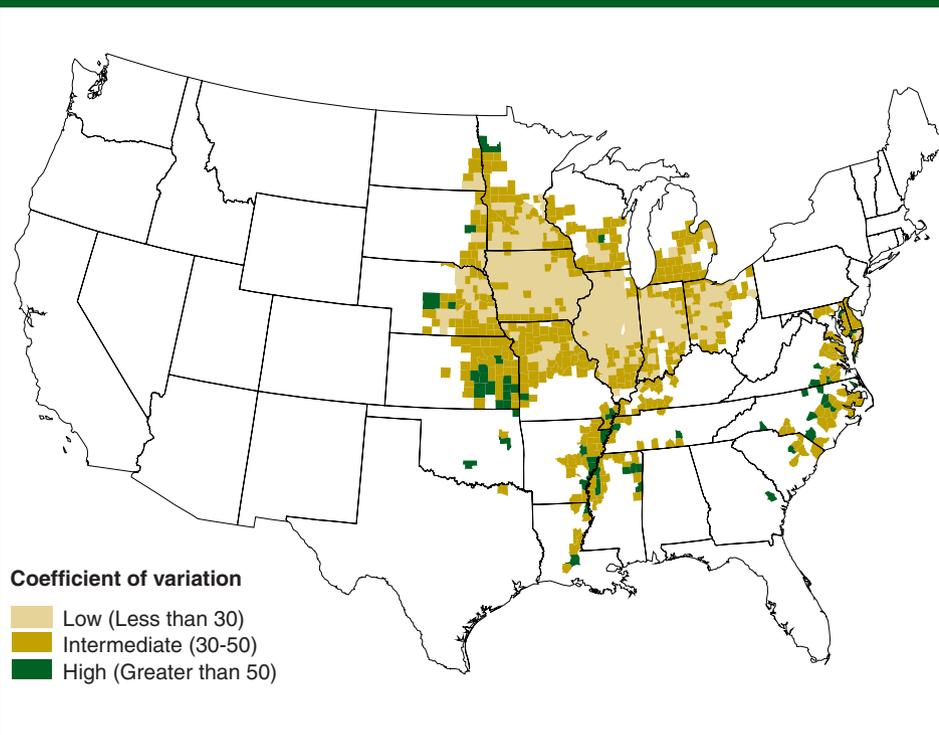
The benefits from revenue insurance depend on the type of program and the type of subsidy offered with revenue insurance. The Federal crop insurance program pays premium subsidies that encourage producers to buy revenue insurance and pays administrative subsidies to private insurance companies that sell and service revenue insurance. These subsidies are based on a share of the premium value of the revenue insurance policies sold.

While the subsidization of revenue insurance helps producers reduce risk, the subsidies also transfer income, although this income is realized only when an insurable loss occurs and results in an indemnity payment. A subsidy structure based on uniform proportions of a premium across areas and crops transfers greater amounts of income per dollar of insured value to riskier crops and areas where premium rates are higher. However, producers of risky crops in risky areas face higher premiums due to greater revenue variability, and may see little relationship between their yields and market price; thus, they still may be reluctant to buy revenue insurance.

**For soybeans grown in the Midwest, offsetting price-yield variability is strong . . .**



**. . . and revenue variability is low**



Source: Analysis by USDA, Economic Research Service of yield data from USDA's Risk Management Agency and price data from USDA's National Agricultural Statistics Service.

**Revenue Insurance Participation Grows With Subsidies**

Revenue insurance was first available under the Federal crop insurance program in 1996. Initially, it was available for corn, soybeans, wheat, and cotton in a limited number of counties. In the late 1990s, availability of revenue insurance for these crops increased and revenue insurance plans for grain sorghum, canola, barley, rice, and sunflower were added. In 2006, revenue insurance accounted for 57 percent of all acreage insured under the Federal crop insurance program, including about three-quarters of the insured acreage of corn, soybeans, and wheat, the top three crops in the program.

When buying revenue insurance, a farmer chooses, before planting, an insurance plan and a coverage level (a share of expected revenue) and pays a portion of the insurance premium that is based on the risk covered. If actual revenue at the end of the season falls below the coverage level multiplied by the amount of expected revenue, the insurance pays an indemnity equal to the difference.

Premium subsidies have been key to inducing farmers to increase their crop insurance coverage. Subsidies for crop insurance, especially for revenue insurance, have been rising since the 1990s. Between 1996 and 2006, the share of subsidized revenue insurance premiums grew from less than 30 percent to 56 percent. In 2006, the Government paid \$1.8 billion in revenue insurance premiums, and producers paid \$1.4 billion.

The overall increase in premium subsidy has included increases in the subsidy rates for higher coverage levels. In response to the increased subsidies and reduced premium costs, producers have insured higher proportions of their expected revenues. In 1999, for instance, about half of the acres insured under revenue insurance were covered at the 70-

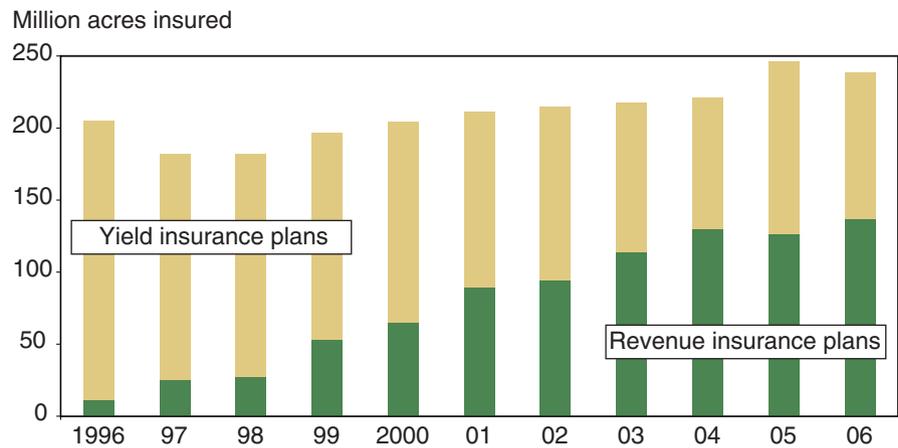
percent level or higher. By 2002, about three-quarters of the revenue-insured acres were at coverage levels of 70 percent or higher. The most popular coverage levels have been 70 and 75 percent of expected revenue.

The variety of options under the Federal crop insurance program gives producers several choices for determining their revenue coverage. Two have been especially popular: coverage that increases if the harvest-time price of the crop is higher than the pre-planting-time price and coverage that is based on separate insured units on the farm. The increasing price feature, called "replacement cost" or "harvest-price option," is attractive to producers because an increase in commodity price can be associated with a drop in yield. The higher coverage would allow a producer to replace lost production at the higher price. Subdividing insured acreage is attractive because if units are insured separately, losses on one unit are not offset by production on another.

### Revenue Insurance Guarantees Fluctuate With Markets

Crop revenue insurance covers variation in market revenue only over a growing season. Revenue is determined from market prices at the beginning and end of

### Revenue insurance acreage surpasses yield insurance acreage in Federal crop insurance program



Source: Tabulations by USDA, Economic Research Service of Summary of Business Data from USDA's Risk Management Agency.

the season. Revenue insurance does not cover interyear revenue variation. The dollar amount of revenue coverage can rise or fall from year to year to reflect different market conditions.

Allowing insurance coverage to vary with market conditions reduces interference with market signals. If prices used to calculate revenue for insurance purposes exceeded expected market prices, producers would have an incentive to alter production merely to collect on the insurance. If prices were below expected market prices, the risk protection provided by

the insurance might be insignificant and producers would have little interest in the protection offered. Such "overinsurance" or "underinsurance" would also undermine an insurance program's balance between premiums and indemnities and could make the program unsustainable.

Canada's experience in the 1990s with the Gross Revenue Insurance Plan (GRIP) illustrates the problem of overinsurance. In 1991, the Canadian Government offered farmers a commodity-level revenue insurance that used historical prices rather than current prices to set guarantees. Specifically, GRIP used average prices over the previous 15 years, which included the relatively high prices of the late 1970s and early 1980s. Because indemnities (insurance payments) were based on the difference between high historical prices and prices in the insured years, indemnities greatly exceeded premiums. By 1998, GRIP was largely discontinued due to financial pressure on the government.

The revenue insurance plans in the U.S. Federal crop insurance program use prices that reflect market conditions in the insurance period and that are observ-



Stockbyte

able by both producers and insurers. In particular, the plans use prices of futures market contracts to determine the value of the insured commodity at the beginning and end of the season, which simplifies calculation of revenue guarantees and losses and ensures that coverage is consistent with current market prices. The availability of data on market expectations is critical to operation of the revenue insurance policies of the crop insurance program.

### **Whole-Farm Revenue Insurance: Simple Idea, Difficult To Administer**

A more broad-based form of revenue insurance—whole-farm revenue insurance—covers all farm enterprises and thus may have wider appeal than commodity-based insurance. Like single-commodity insurance, whole-farm insurance charges risk-based premiums and makes payments (indemnities) when revenue drops below expectations. But, instead of covering revenue for each crop on the farm separately, whole-farm revenue insurance covers combined revenue.

USDA's Risk Management Agency operates two small programs of whole-farm revenue insurance: Adjusted Gross Revenue (AGR) and Adjusted Gross Revenue-Lite (AGR-Lite). Intended for pro-

ducers of commodities for which single-commodity crop yield and revenue insurance are available, AGR and AGR-Lite have limits that keep them from being full-fledged whole-farm insurance programs. Although simple in concept, developing and operating a whole-farm revenue insurance program that would be available to all farmers is not likely to be simple.

A major issue would be determining and measuring the risks covered. Developing premium rates for whole-farm insurance is complex because coverage includes all prices and yields and their interrelationships on a particular farm. Expanding the limited AGR and AGR-Lite insurance plans into a program for all farms would likely mean covering risks from more farm enterprises, particularly more specialty crop and livestock enterprises, which would make such a program even more complex. Moreover, if the insurance were to cover net, rather than gross, revenue, input cost variability would have to be considered in determining coverage and measuring risk.

Determining the level of income and the farming activities covered by a whole-farm insurance policy would challenge both producers and insurers. AGR and AGR-Lite rely heavily on tax records but often have to make adjustments to account for changes in inventory to make insured income levels correspond to production in a calendar year. Most farmers report income on their tax schedules when the money is received or paid, which may not reflect the underlying annual revenue risk.

How well a farm's historical income indicates expected income in the insurance year is also critical. Farm operations often change size and commodities from year to year. For example, expanding a farm by renting additional land or switching land from corn to soybeans can dramatically change overall expected gross revenue. These changes result in variability

in income that is not simply the result of risk or unexpected variability. Unless income data are adjusted, a process that is likely to be complex, farms can be significantly overinsured or underinsured.

Verifying insurance losses and paying claims pose an additional problem. Existing revenue insurance payments at the commodity level are triggered by readily observable prices and crop losses. Whole-farm revenue insurance, in contrast, incorporates prices and production of many farming activities that are hard to verify. Complex rules have been developed for measuring and validating insured losses under AGR and AGR-Lite policies. In addition, because tax filings are used for documenting income, several months can elapse between the event that caused a drop in income and the filing of the documentation for a claim (see box, "Canadian Agricultural Income Stabilization: A Whole-Farm Revenue Program").

### **Can Revenue Insurance Provide Adequate Risk Management?**

Although revenue insurance has several characteristics that make it a valuable risk-management tool, it may not provide farmers with what policymakers and the farmers themselves regard as adequate coverage. Because both single-commodity and whole-farm revenue insurance combine risks, they can mean less frequent, lower payments to farmers when the risks offset each other. Single-commodity revenue insurance combines price and yield coverage. Whole-farm revenue insurance combines coverage of individual commodities on a farm. Experience suggests that farmers prefer to separate insurance protection. For example, most participants in the Federal crop insurance program subdivide their farm acreage for insurance purposes, even though doing so requires that they forgo a premium discount.



## Canadian Agricultural Income Stabilization: A Whole-Farm Revenue Program

Since 2003, the Canadian Federal and provincial governments have operated the Canadian Agricultural Income Stabilization (CAIS) program for Canadian farmers. Although not truly insurance, CAIS has several characteristics of a fully subsidized whole-farm income insurance program. CAIS allows participants to shift the risk of income declines to an insurer, the government in this case. Participants establish insured amounts of income based on recent history. Like insurance, the program makes immediate and ongoing protection available to all participants. Unlike insurance, participants are not charged a risk-based premium. Instead, they pay a flat fee per amount covered.

Under CAIS, the amount of income to be covered is based on a producer's margin. The margin is defined as income minus expenses directly related to the primary production of agricultural commodities on the farm. In particular, income is the sale of agricultural commodities and proceeds from production (crop) insurance but excluding other government payments; expenses are costs, such as feed, fertilizer, and pesticides. CAIS payments are made when a farmer's claim-year margin falls below his or her reference margin, which is an Olympic average of the producer's margin for the previous 5 years. (An Olympic average is a 5-year average that "drops" the highest and lowest values.)

The CAIS participant annually selects a level of protection, a proportion of his or her historical margin. Substantial government benefits are paid if the participant's margin falls. As the producer's loss deepens, government assistance increases. The first 15 percent of a producer's loss (the part between 100 percent and 85 percent of the margin) would be shared 50-50 with the government. For

the next 15 percent of loss, the government's share is 70 percent of the drop in margin. For the portion of the decline less than 70 percent of the reference margin, the producer would receive 80 percent from the government.

CAIS provides for situations in which the margin is negative, that is, when expenses exceed income. If the producer satisfies certain criteria, the producer is eligible to receive 60 percent of the program-year margin decline that falls within the negative margin. However, the maximum total government contributions that a farmer can receive under CAIS in a given year is capped at the lesser of C\$3 million, or 70 percent of the margin decline of the program-year margin relative to the reference margin. Any negative portion of the program-year margin is included in the calculation of the 70-percent cap.

CAIS has undergone two major changes since it was introduced. One reduced the participation cost to producers. In the first years of the program, 2003-05, a participant was required to maintain a deposit of 22 percent of the reference margin in a CAIS account. In 2006, the deposit was replaced by an annual "participation fee" of C\$4.50 per C\$1,000 of margin covered. The other change was to include a "market loss" in payments to producers. In 2006, the method of calculating inventory changes was amended so that losses in inventory values caused by declining commodity prices are reflected in a producer's payment. This method is applied to market commodities but not to productive assets such as breeding livestock. Additional payments, based on the new method, were made to producers for 2003-05.

Because insurance design requires that insured producers pay the first portion of any loss (the deductible), it may seem that insurance cannot provide adequate protection because coverage will always be less than the full value of the item insured. While reducing deductibles can make insurance more attractive, it also increases costs as well as loss claims, and tends to lead to overinsuring, thus interfering with market signals.

Neither single-commodity nor whole-farm revenue insurance provides coverage

against multiple-year income declines. These policies base coverage on historical yields and expected market prices, in the case of single-commodity insurance, and on historical income, in the case of whole-farm insurance. If these measures indicate a revenue decline, revenue insurance coverage will decline. One way to counteract this is to use fixed target prices or target revenues instead. This modification, however, would make the protection less of an insurance tool and more of an income-support program. **W**

### This article is drawn from . . .

*Whole-Farm Approaches to a Safety Net*, by Robert Dismukes and Ron Durst, EIB-15, USDA, Economic Research Service, June 2006, available at: [www.ers.usda.gov/publications/eib15/](http://www.ers.usda.gov/publications/eib15/)

### You may also be interested in . . .

The ERS Briefing Room on Farm Risk Management, [www.ers.usda.gov/briefing/riskmanagement/](http://www.ers.usda.gov/briefing/riskmanagement/)

# Brazil's Booming Agriculture Faces Obstacles

Constanza Valdes, [cvaldes@ers.usda.gov](mailto:cvaldes@ers.usda.gov)

- Brazil has emerged as an important player in global food and agricultural markets.
- But the long-term growth of Brazilian agriculture could slow due to supply-side factors.
- And continued growth in domestic food demand and the changing composition of food demand could dampen growth in processed and high-value agro-food exports.



Brazil has emerged as an agricultural superpower in global food and agricultural markets thanks to economic and trade stability and regulatory reforms that encourage investment in agriculture. Brazil is an important producer and the largest exporter of sugar, ethanol, beef, poultry meat, coffee, orange juice, and tobacco.

Fernando Bueno, GettyImages

Rising global income and Brazil's ready availability of land, water, and labor to increase crop and meat production have driven exports. Brazil exports agricultural and food products, such as soybeans, pork, and poultry, to most countries of the world, including large markets in the European Union (EU) and the United States. But soaring demand in China has been at the root of much of Brazil's export growth. Brazil's agro-food sector accounted for over two-thirds of its total trade surplus in 2005. At US\$27.5 billion, Brazil's agro-food trade surplus is the largest in the world. Brazil's success in world markets has given U.S. farmers a powerful competitor.

Although greater competitiveness in the agro-food sector can be partially attributed to market liberalization up to early 1999, new methods of providing government incentives for Brazilian agriculture also contributed to the agricultural growth. These include preferential credit,

tax exemptions, financing for agricultural research, marketing and infrastructure improvements, as well as an array of Federal, State, and local subsidies.

Continuing trade expansion and diversification of markets and products remain at the core of Brazil's agricultural growth strategy. However, several constraints could hinder further long-term growth of Brazilian agriculture. Supply-side constraints include adverse macroeconomic shocks, ongoing transportation and marketing bottlenecks, financial constraints, and a slowdown on the expansion of agricultural land. On the demand side, rising consumer demand for high-value foods plus the growth of Brazil's bio-fuels industry could reduce the availability of Brazil's exportable surpluses.

### Agro-Food Sector Important to the Brazilian Economy

Over the past decade, Brazil—the world's 11th largest economy—has been

consolidating its position as an important agro-food producer and major supplier to international markets. Production agriculture accounted for 10 percent of the country's gross domestic product (GDP) in 2005, but with the associated supply chain, the agro-food sector (production agriculture, processing, and distribution) accounts for nearly 27 percent of total exports and employs 18 million people, equivalent to 37 percent of the labor force. The agro-food sector, which was valued at US\$254 billion in 2005, accounted for 28 percent of the country's GDP.

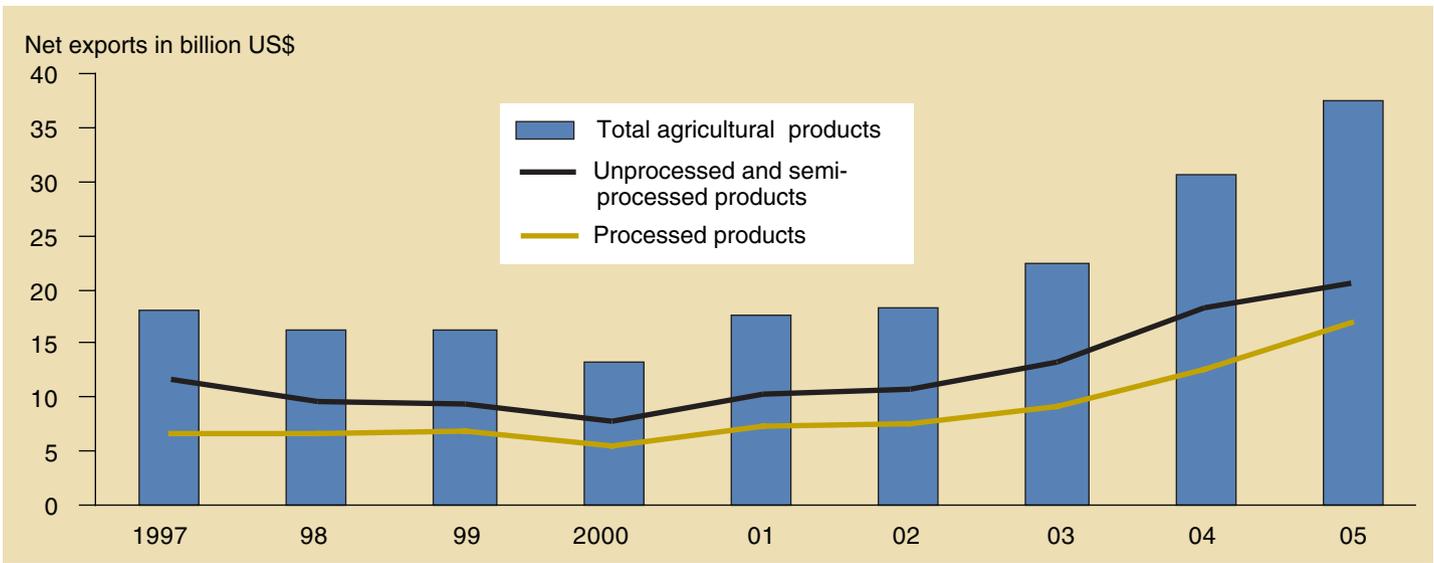
Brazil enjoys a low-cost resource base for agricultural production and has easily raised output by expanding area and increasing productivity. Production expansion has exceeded the rate of increase in consumer demand, leaving surplus production for more exports. Major economic and agricultural policy changes, including those that encourage investment in the sector, have broadened export channels.

### Brazil's growing dominance in world agriculture, 2005 rankings

Commodity	World rank		Market share of global exports	Total exports 2005 US\$ million	Export growth rates, 2000-05 Percent
	Exports	Production			
Sugar	1	1	42	3,919	20
Ethanol	1	1	51	766	79
Coffee	1	1	26	2,533	11
Orange juice	1	1	80	796	4
Tobacco	1	1	29	1,380	15
Beef	1	2	24	2,944	32
Poultry	1	3	35	3,770	31
Soybeans	2	2	35	5,345	22
Soymeal	2	2	25	2,865	13
Corn	4	3	35	121	48
Pork	4	4	13	1,252	40

Note: Harmonized codes: sugar (1701), ethanol (2207), coffee (0901), orange juice (2009), soybeans (1201), beef (0201/0202/160250), poultry meat (0207/160231/160232/160239), pork (0203/160241/160242/160249), soymeal (2304), corn (1005), and tobacco (2401). Source: USDA's Foreign Agricultural Service and Global Trade Information Services data.

**Brazil's unprocessed and processed agro-food exports**



Source: Calculations by USDA, Economic Research Service using Global Trade Information Services data.

The value of Brazil's 2005 agricultural exports reached US\$30.9 billion, led by soybeans and products, sugar, ethanol, beef, pork, and poultry. Since 2000, the value has grown at an average rate of 20 percent per year. Brazil also imports commodities that it does not produce competitively, including wheat. The value of those imports was US\$3.4 billion in 2005.

Exports of primary bulk, semi-processed, and processed commodities (soybeans, fresh, chilled and processed meats, coffee, flour and oils) have contributed the most to Brazil's total agricultural exports. Primary bulk agro-food products grew 8 percent annually during 1997-2005, compared with 9 percent annually for processed products and 5 percent annually for semi-processed products. Horticultural products, which include fruits, vegetables, flowers, nuts, and spices, have grown at a rate of 10 percent per year since 1997; however, both the volume and growth in horticultural exports are low as sanitary and phytosanitary regulations restrict access to foreign markets.

Since 2000, growth of exports of processed agro-food products accelerated to 20 percent per year. The food manufacturing industry has been stimulated by the desire for higher per unit returns, access to new processing technologies and international capital, and a growing entrepreneurial class. Between 2004 and 2005, the growth in exports of processed products (fresh, frozen, and processed meats, dairy products, breakfast cereals) accelerated, expanding by 33 percent, and now accounts for 44 percent of agro-food exports. In 2005, primary bulk commodities accounted for 25 percent of total Brazilian agro-food trade.

**Stability and Reforms Support Farm-Sector Expansion**

Rapid expansion of Brazilian agriculture and agro-food restructuring began in the mid-1980s, with the end of a policy regime that had channeled resources away from agriculture into the industrial and services sectors. Economic reforms in 1985 sought to eliminate domestic and export taxes and restrictions on agricultur-

al exports of soybeans, cotton, and meat and to eliminate import licenses for corn. During the early 1990s, the Government also removed much of the state intervention in agricultural markets—privatizing state enterprises and eliminating minimum support prices, government purchases of wheat and milk, and marketing boards (for coffee, sugar, and wheat).

But the most significant economic factor affecting agricultural output in Brazil since the mid-1990s was introduction of the successful Real Economic Stabilization Plan. Before 1994, Brazil had inflation levels generally well above 1,000 percent a year. To halt inflation, a new currency, the real, was introduced, which was initially pegged to the U.S. dollar and later followed a "crawling peg" policy of nominal depreciation of the real against the dollar. The Real Plan stabilized the economy, reducing inflation to around 5 percent per year and setting off a domestic demand boom that lasted for 5 years.

In early 1999, Brazil adopted a floating exchange rate. The real depreciated considerably, making Brazil an attractive

low-cost supplier of food and agricultural products. That stimulus led to the rapid expansion in soybean and meat production (see box, "The Impact of Exchange Rates on Brazil's Agro-Food Sector").

The Real Plan was accompanied by further privatization of state enterprises and elimination of remaining barriers to foreign investment, facilitating the presence of multinational companies in Brazil. Multinationals stimulated investment in agricultural research and development of integrated supply chains that link inputs with commodity production and distribution. In addition, by granting credit to producers to buy inputs (fertilizers, seeds, and chemicals), the large multinational corporations have alleviated the difficulties that Brazilian producers had in seeking credit from commercial banks.

As a result, production of major crops (soybeans, corn, rice, edible beans, and wheat) rose to 54 million tons in 1990, double the level of 1970. During the 1990s, total oilseed area increased 1.0 percent per year, compared with a decrease of 1.9 percent per year for total grain area, while yield increased 5.2 percent per year, compared with 4.3 percent per year for grains.

Crop production in Brazil reached an all-time high of 108 million tons in 2005, a fourfold increase from that of the 1970s. In addition to expanding export markets, a principal factor fueling growth and modernization in the crop sector was expansion of Brazil's hog and poultry industries and the accompanying rise in food demand. While output of edible beans and rice, major food staples, expanded roughly at the rate of population growth, soybean and corn production grew much more rapidly. Corn was once considered a Brazilian subsistence crop, but rising demand for meat and eggs associated with rising incomes has led to an expansion of the mixed feed industry and increased demand for corn by Brazil's fast-growing poultry and hog industries.

### The Impact of Exchange Rates on Brazil's Agro-Food Sector

A currency devaluation will impact domestic and foreign prices, production costs, and debt indexed in local and foreign currencies. With the devaluation, prices of commodities in local currency increase whereas all costs measured in foreign currency decrease, leading to higher profit margins and increased revenues. On the other hand, producers and processors with foreign-denominated debt see that debt increase in local currency terms.

Both real and nominal exchange rates have enormous effects on Brazil's competitiveness in international markets. In recent times—1999 and 2001—Brazil has had two major currency devaluations. The accumulated devaluation between 1999 and the peak nominal rate in mid-2002 was 217 percent and through the end of 2005, the accumulated depreciation was 82 percent.

The economic impact of devaluation on the domestic agro-food industries depends on the price structure within the economy and the response of relative commodity prices to the devaluation. For example, the devaluation of the Brazilian currency benefited exporters, while reducing the profitability of imports.

In the case where Brazil's share of the world export market is high, the positive effect from the devaluation can be offset by a decline in world commodity prices. For example, the 1999 devaluation of the real raised expected returns to soybeans, which in turn led to a 20-percent expansion in area planted to soybeans in the 2000/01 crop year. The increase in area planted and higher production translated into 35-percent growth in soybean export volume. Since Brazil is a large player in the international soybean market, this export expansion led to changes in world prices and feedback effects, as well as a 2-percent decline in world soybean prices by 2001.

Since 2004, the real started a new period of appreciation, which makes Brazilian agro-food products more expensive to importers around the world.

### Future Growth in Agriculture Could Slow Due to Supply-Side Obstacles...

Agriculture in Brazil still has plenty of room to grow. Brazil is using only one-third of its potential arable land, suggesting that continued growth of agriculture is possible. But a number of factors are likely to slow expansion in production and trade.

*A more risky, less stable macroeconomic environment.* The economic stability attained with macroeconomic reform during 1994-99 and a managed depreciat-

ing exchange rate signaled lower risk and stimulated investment and growth in the agro-food sector. But judging by the appreciating exchange rate, the current economic environment has dampened growth prospects for Brazil's agro-food sector. The restrictive monetary policy to keep inflation under control has resulted in rising interest rates, which in turn attract dollar-denominated capital inflows. The inflows have increased demand for reals, which have been steadily appreciating since September 2004. The appreciation has

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already affected Brazil's competitive pricing and the profitability of its food and agricultural exports. For example, by July 2006, the real had appreciated 32 percent against the U.S. dollar, potentially making Brazilian export products about one-third more expensive in other countries. With the real expected to continue to appreciate, Brazilian exporters will face a deteriorating competitive position in global food and agricultural markets.

*Limited access to financing.* Producers are expected to see more limited access to credit for production and marketing of crops and livestock due to two factors: the high current rate of indebtedness of crop and livestock producers and the higher cost of credit available to producers because of higher interest rates. In Brazil, financing for agriculture comes from three sources: government agricultural credit disbursed through the National System of Rural Credit, SNCR (26 percent); agricultural processors (20 percent); and commercial banks or other government agencies (54 percent). About two-thirds of the US\$27 billion credit line announced for the 2006/07 crop year, to be disbursed under the SNCR, will be at the subsidized interest rate of 8.75 percent per year. The gov-

ernment serves as the guarantor for those loans. All other credit will have to be financed at rates close to the prevailing commercial rate—now more than 15 percent. Agricultural industries and the commercial banks perceive credit to agriculture as higher risk due to the already high level of farm indebtedness. The current level of nonperforming loans is estimated at US\$7 billion, around 10 percent of the value of agricultural production. For the immediate future, a much larger share of a producers' working capital and investment will have to be financed at higher rates. The reduced availability and access to low-interest credit will have a dampening effect on the investment boom underway in the Brazilian agro-food sector.

*Slower land expansion.* The current agricultural area is 62 million hectares, but the potential for expansion is three times this amount, including 69 million hectares in the Cerrados tropical savannah area. The amount of credit required, however, for bringing the additional land into cultivation and further expanding agricultural production is more than double the credit expected to be available in the more risky economic climate. Additionally, continued expansion in the Cerrados and Amazon

forest areas is likely to be constrained by environmental concerns about the rate of land clearing. Even so, the expected rate of expanding area to crop and livestock production in Brazil will be one of the world's highest—4.5 percent per year over the next 10 years, or about 1.8 million hectares per year.

*Infrastructure, transportation, and marketing bottlenecks.* These undermine the competitive position of Brazil in world markets and translate into higher costs. Development of storage facilities, port facilities, roads, and railways has not kept pace with the breakneck pace of growth in agricultural production and exports. In recent years, higher soybean volumes for export markets have overwhelmed loading docks at Brazilian ports, resulting in long delays (measured in days, not hours) and additional costs. Some farm commodities travel 1,000 miles or more over poor and highly congested roads to reach the port. Less than one-quarter of national roads are officially deemed in good condition in Brazil. Recent studies have shown that the cost for logistics when exporting soybeans from Brazil is, on average, 83 percent higher than in the United States and 94 percent higher than in Argentina.



Pio Figueiroa, GettyImages

Large investments in rehabilitating and expanding transport infrastructure are needed to keep up with expected demand growth and to lower the Custo Brazil (Brazilian cost). Custo Brazil is a term that has come to denote general cost of inefficiency from production and distribution bottlenecks, including the various logistical transactions associated with exports. Transaction export costs (an indicator of the Custo Brazil) represent 15-20 percent of the free-on-board (f.o.b.) price for agricultural commodities. While the Custo Brazil could be reduced through investments in producer-to-market, producer-to-port, and port-to-market distribution systems to reduce delivery times and costs and to maintain product quality, those investments will come too little too late to relieve the transportation bottleneck for the next several years.

### ...Continuing Sanitary and Phytosanitary Restrictions on Exports...

Brazil is still blocked from important markets in the North American Free Trade Agreement (NAFTA) and East Asia, due to sanitary and phytosanitary (SPS) restrictions. For example, Brazil has been unable to gain access to important markets for fresh, chilled, and frozen beef and pork products among NAFTA members—the United States, Canada, and Mexico—or Japan, South Korea, and Taiwan because of sanitary concerns, mainly Brazil's foot-and-mouth disease status. Brazil's poultry meat exports are accepted by some premium markets, such as Japan and Korea, but the U.S. and Canada still bar imports of Brazil's fresh, chilled, and frozen poultry meat because of disease concerns, particularly Exotic Newcastle Disease (END). END re-appeared in July 2006 after 5 years without outbreaks. Oilseeds have also faced sanitary restrictions from time to time. In

2005, for example, some shipments of Brazilian soybeans to China were barred from entry because of fungicide contamination. These constraints can be eliminated only by negotiations with trade partners and may require changes in domestic SPS policies and procedures, which could be very expensive.

### ...and Shifts in Domestic Demand

*Industrial use versus food use.* Changes in the composition of industrial use versus food use of agricultural production will affect the availability of agro-food commodities for the domestic and export markets. For example, the rapid expansion of Brazil's biofuel industry could profoundly affect the availability of grains and oilseeds for export and other domestic uses. Brazil's sugarcane and associated sugar and ethanol industries have grown rapidly in the last 5 years. Ethanol now accounts for 37 percent (in volume) of fuel

used by passenger cars. In further efforts to reduce Brazil's dependency on fossil fuels, Brazilian researchers are also investigating new biodiesel technologies (using castor, soybean, sunflower, cottonseed, and palm oils). Diesel consumption in Brazil is about 59 percent of total fuel use. Demand for soybeans as a raw material for biodiesel will likely increase use of Brazil's excess crushing capacity but dampen the recent boom in soybean exports.

*Food demand.* Future changes in the composition of food demand and the need to meet rising domestic demand will also dampen agricultural export growth. Improved economic performance, growth in per capita income, a more balanced income distribution, continued population growth, and retail marketing are expected to strengthen demand for the quantity and quality of food products in Brazil. For wealthier consumers, growing urbanization and rising incomes may shift greater food consumption toward higher value and processed food products (meats, fats and oils, dairy products, and ready-to-eat foods). For lower income consumers, the need to meet necessary caloric requirements may be the primary driver of food consumption patterns.

Brazil is a large, growing market—population of 183 million—with a large middle class and a large youth market. Brazil is categorized by the World Bank as a lower middle-income country with per capita gross income of US\$3,300 in 2006. However, disparities in income distribution have restricted food demand. Better income distribution, rising incomes, and the new Zero Hunger social program, which seeks to provide food access to 46 million people in 9.5 million households, could change domestic food consumption patterns as a large share of additional disposable income may be

used to raise animal protein consumption (meat and eggs). Per capita meat consumption has grown annually by 2 percent on average since 1995.

Higher income is expected to lead to greater consumption of higher quality meats and other processed and high-value food products. Continued growth in domestic food demand and, more importantly, the changing composition of food demand will dampen growth in processed and high-value agro-food exports.

Despite great strides for Brazilian agriculture in world markets, the competitiveness and efficiency of Brazil are under pres-

sure from a number of sources. On the supply side, adverse changes in the macro economic environment could slow down new investment. Output expansion could be limited by lack of financial resources for agricultural production, environmental regulations restricting the land expansion rate, lack of investment in infrastructure, and diseases, such as soybean rust. On the demand side, Brazilian products are blocked from a number of foreign markets because of SPS concerns, and growing demand for raw materials for biofuels and increases in domestic food consumption could reduce exportable surpluses.  $\mathbb{W}$

#### This article is drawn from . . .

"Foot and Mouth Disease in Brazil," by Constanza Valdes, in *Livestock, Dairy, and Poultry Outlook*, LDP-M-137, USDA, Economic Research Service, November 17, 2005, available at: [www.ers.usda.gov/publications/ldp/nov05/ldp137t.pdf](http://www.ers.usda.gov/publications/ldp/nov05/ldp137t.pdf)

"Brazilian Meat Industry," by Constanza Valdes, in *Livestock, Dairy, and Poultry Outlook*, LDP-M-138, USDA, Economic Research Service, December 16, 2005, available at: [www.ers.usda.gov/publications/ldp/dec05/ldpm138t.pdf](http://www.ers.usda.gov/publications/ldp/dec05/ldpm138t.pdf)

"Factors Affecting Brazilian Growth or Are There Limits to Future Growth of Agriculture in Brazil?" by Ignez Vidigal Lopes, Mauro de Rezende Lopes, Constanza Valdes, Marilene Silva de Oliveira, Pedro Rangel Bogado, Getulio Vargas Foundation, Rio de Janeiro, Brazil, 2006.

"Brazil's Agribusiness: Threat or Opportunity for the NAFTA?" by Constanza Valdes, Elisio Contini, Ivan Wedekin, Arnaldo Chibbaro, in *Achieving NAFTA Plus – Executive Summary*, Third Annual NAAMIC Workshop, Calgary, Alberta, Canada, May 2006.

#### You may also be interested in . . .

The ERS Briefing Room on Brazil, [www.ers.usda.gov/briefing/brazil/](http://www.ers.usda.gov/briefing/brazil/)

"China's Growing Affluence: How Food Markets Are Responding," by H. Frederick Gale, in *Amber Waves*, Vol. 1, Issue 3, USDA, Economic Research Service, June 2003, available at: [www.ers.usda.gov/amberwaves/june03/features/chinasgrowingaffluence.htm](http://www.ers.usda.gov/amberwaves/june03/features/chinasgrowingaffluence.htm)

"The Elephant is Jogging: New Pressures for Agricultural Reform in India," by Maurice Landes, in *Amber Waves*, Vol. 2, Issue 1, USDA, Economic Research Service, February 2004, available at: [www.ers.usda.gov/amberwaves/february04/features/elephantjogs.htm](http://www.ers.usda.gov/amberwaves/february04/features/elephantjogs.htm)

# Revised Market Basket Statistics Reflect Consumers' Changing Produce Purchases

Hayden Stewart, [hstewart@ers.usda.gov](mailto:hstewart@ers.usda.gov)

More and more of what consumers spend for their groceries has gone to the firms that process, package, and distribute agricultural commodities. The farm share of retail food prices has likewise been shrinking. For example, farmers earned 33 percent of what consumers spent for fresh fruit at retail foodstores in 1982, but just 20 percent in 2004. Likewise, the share for fresh vegetables shrank from 34 to 19 percent. However, new research finds that the more recent estimates understate the share of the produce dollar going to the farmer.

ERS's market basket data series measures the spread (or difference) between the price paid by consumers for a mix or basket of foods purchased in foodstores and the revenues earned by farmers for supplying the commodities in those foods. ERS estimates spreads for nine commodity groups: fresh fruit, fresh vegetables, dairy foods, meat products, poultry, eggs, fats and oils, processed fruit and vegetables, and bakery/cereal products. The series aims to inform both policymakers and the agricultural community about the cost of marketing commodities and how these costs compare with what farmers themselves earn. The farm share does not measure farm income or profitability.

Each consumer commodity basket strives to represent the food items and quantities bought by a typical American household in a year. The corresponding farm basket contains the amounts of agricultural commodities that produce the contents of the consumer basket, taking into account losses due to trimming at processing facilities and spoilage at retail stores. Thus, the consumer basket for fresh vegetables contains 20.2 pounds of carrots, while the farm basket contains 20.8 pounds.

The contents of the consumer and farm baskets are based on 1982-84 data on American households' grocery store purchases. Applying measures of retail price inflation supplied by the Bureau of Labor Statistics and yearly farm prices allows ERS to update values each year. The total farmgate value of all commodities used to produce the consumer basket for fresh vegetables in 2004 was \$48.77, 19 percent of the estimated price of \$256 for the consumer basket.

U.S. food shopping habits have changed since 1982, and fresh fruit and fresh vegetable shopping are no exception. Between 1987 and 1997, the average supermarket produce department expanded from 4,817 to 5,140 square feet, and the number of items stocked grew from 173 to 335 over the same period. ERS's food availability data, which include both the at-home and away-from-home markets, show dramatic changes in the quantities of some fresh fruit and

fresh vegetables available for consumption since 1982. Notable increases have occurred in the per capita supply of bell peppers (up 3.9 pounds) and broccoli (up 3.5 pounds). Until 1985, the supply of romaine lettuce was too small to track, but totaled 11.2 pounds per person in 2003.

ERS is currently reviewing each of the nine commodity groups in its market basket series, and used purchase data on about 7,000 households in both 1999 and 2003 to compile new consumer baskets for fresh fruit and fresh vegetables. Updated farm baskets were also calculated to correspond with these new consumer baskets.

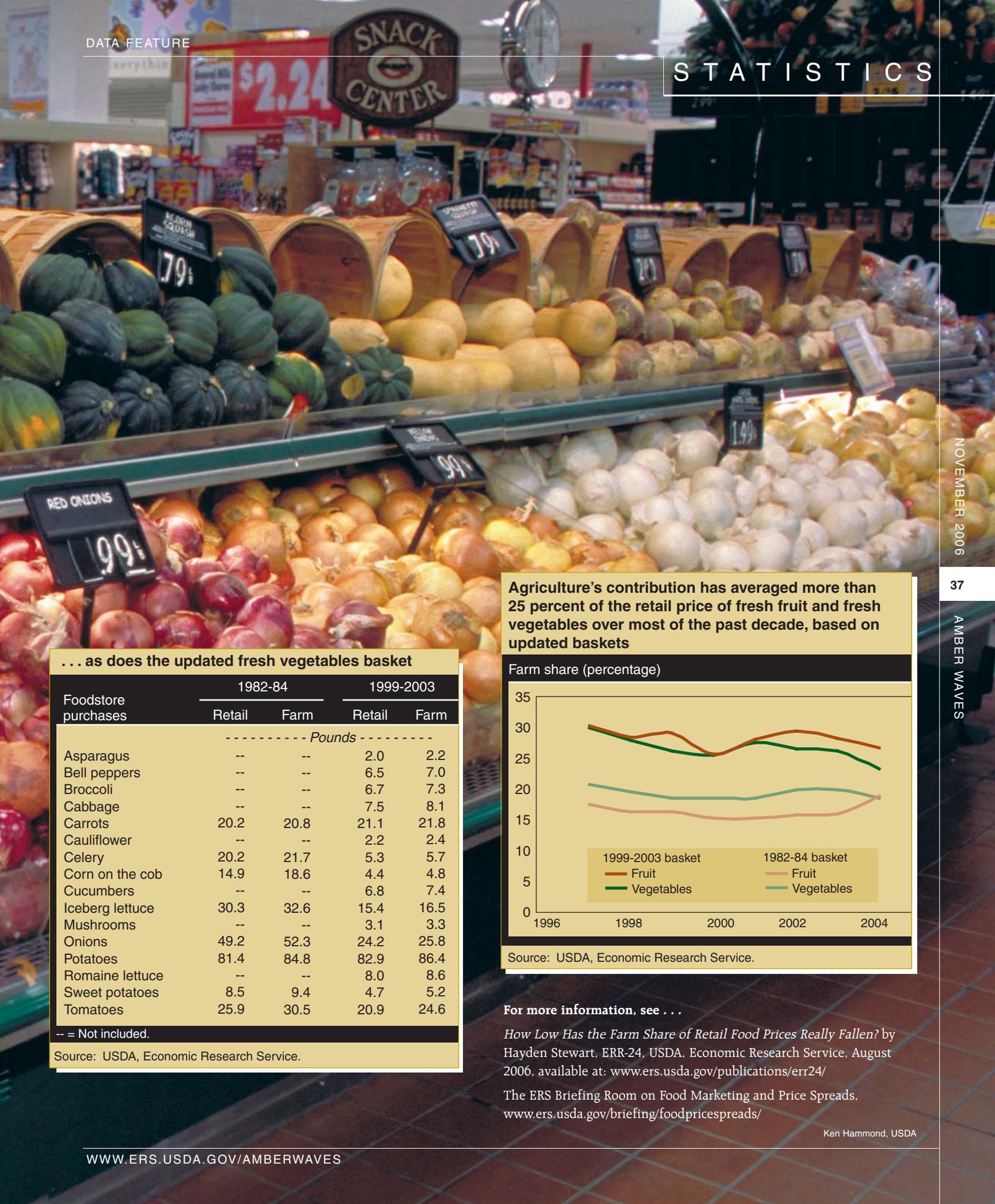
Based on the new farm baskets, farm revenues accounted for 26.6 percent of consumer spending for fresh fruit at retail foodstores in 2004 and 23.5 percent for fresh vegetables. These estimates are higher than estimates provided by the current series partly because the new baskets contain more fruit and vegetables with higher farm values. For example, the new basket for fresh vegetables adds asparagus (with a relatively high farm value of \$1.22/pound), bell peppers (\$0.34), broccoli (\$0.33), mushrooms (\$1.14), and romaine lettuce (\$0.19). By contrast, celery (\$0.15), corn on the cob (\$0.21), iceberg lettuce (\$0.17), and onions (\$0.11) are less represented in the updated basket.

## Updated fresh fruit basket reflects the greater variety of purchases by a typical household ...

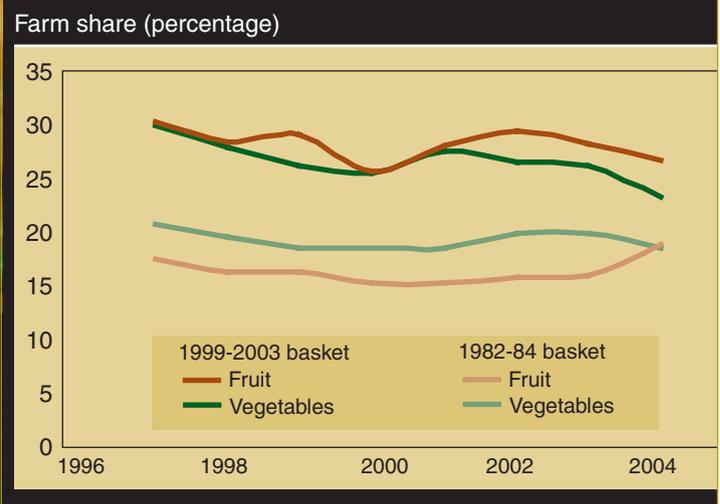
Foodstore purchases	1982-84		1999-2003	
	Retail	Farm	Retail	Farm
	----- Pounds -----			
Apples	41.7	44.4	34.1	35.5
Cantaloup	8.8	10.1	11.3	12.2
Cherries	--	--	2.1	2.3
Grapefruit	13	0.2*	15.1	15.5
Grapes	14.7	17.3	15.9	17.5
Honeydew melon	--	--	1.8	2.0
Kiwifruit	--	--	0.9	1.0
Lemons	6.9	0.1*	6.0	6.3
Oranges	39.8	0.5*	25.0	25.8
Peaches	11.1	12.3	8.9	9.4
Pears	5	5.4	3.9	4.1
Plums	--	--	2.5	2.6
Strawberries	3.4	3.9	8.3	9.0
Watermelon	--	--	19.8	22.0

\* = boxes -- = Not included.

Source: USDA, Economic Research Service.



**Agriculture's contribution has averaged more than 25 percent of the retail price of fresh fruit and fresh vegetables over most of the past decade, based on updated baskets**



Source: USDA, Economic Research Service.

For more information, see . . .

*How Low Has the Farm Share of Retail Food Prices Really Fallen?* by Hayden Stewart, ERR-24, USDA, Economic Research Service, August 2006, available at: [www.ers.usda.gov/publications/err24/](http://www.ers.usda.gov/publications/err24/)

The ERS Briefing Room on Food Marketing and Price Spreads, [www.ers.usda.gov/briefing/foodpricespreads/](http://www.ers.usda.gov/briefing/foodpricespreads/)

Ken Hammond, USDA

**. . . as does the updated fresh vegetables basket**

Foodstore purchases	1982-84		1999-2003	
	Retail	Farm	Retail	Farm
----- Pounds -----				
Asparagus	--	--	2.0	2.2
Bell peppers	--	--	6.5	7.0
Broccoli	--	--	6.7	7.3
Cabbage	--	--	7.5	8.1
Carrots	20.2	20.8	21.1	21.8
Cauliflower	--	--	2.2	2.4
Celery	20.2	21.7	5.3	5.7
Corn on the cob	14.9	18.6	4.4	4.8
Cucumbers	--	--	6.8	7.4
Iceberg lettuce	30.3	32.6	15.4	16.5
Mushrooms	--	--	3.1	3.3
Onions	49.2	52.3	24.2	25.8
Potatoes	81.4	84.8	82.9	86.4
Romaine lettuce	--	--	8.0	8.6
Sweet potatoes	8.5	9.4	4.7	5.2
Tomatoes	25.9	30.5	20.9	24.6

-- = Not included.

Source: USDA, Economic Research Service.

Data may have been updated since publication. For the most current information, see [www.ers.usda.gov/publications/agoutlook/aotables/](http://www.ers.usda.gov/publications/agoutlook/aotables/).

## Farm, Rural, and Natural Resource Indicators

	2002	2003	2004	2005	2006	Annual percent change			
						2002-03	2003-04	2004-05	2005-06
Cash receipts (\$ billion)	195.0	215.5	237.9	238.9	235.3 f	10.5	10.4	0.4	-1.5
Crops	101.0	109.9	114.3	114.0	116.3 f	8.8	4.0	-0.3	2.0
Livestock	94.0	105.6	123.6	125.0	119.0 f	12.3	17.0	1.1	-4.8
Direct government payments (\$ billion)	12.4	16.5	13.0	24.3	18.2 f	33.1	-21.2	86.9	-25.1
Gross cash income (\$ billion)	222.2	247.8	267.8	280.9	272.3 f	11.5	8.1	4.9	-3.1
Net cash income (\$ billion)	50.7	70.0	81.5	81.2	63.2 f	38.1	16.4	-0.4	-22.2
Net value added (\$ billion)	82.2	102.0	128.9	120.4	103.0	24.1	26.4	-6.6	-14.5
Farm equity (\$ billion)	1,110.7	1,180.8	1,383.1	1,591.2	1,702.1 f	6.3	17.1	15.0	7.0
Farm debt-asset ratio	14.8	14.4	12.7	11.9	11.3 f	-2.7	-11.8	-6.3	-5.0
Farm household income (\$/farm household)	65,761	68,597	81,596	79,961	75,848 f	4.3	18.9	-2.0	-5.1
Farm household income relative to average U.S. household income (%)	113.7	116.1	134.8	126.2	na	2.1	16.1	-6.4	na
Nonmetro-metro difference in poverty rate (% points)	2.6	2.1	na	na	na	-19.2	na	na	na
Cropland harvested (million acres)	307	315	312	312 p	na	2.6	-1.0	0.0	na
USDA conservation program expenditures (\$ bil.) <sup>1</sup>	4.2	4.3	5.1	na	na	2.4	18.6	na	na

## Food and Fiber Sector Indicators

U.S. gross domestic product (\$ billion) <sup>2</sup>	10,470	10,971	11,734	12,487	na	4.8	7.0	6.4	na
Food and fiber share (%)	4.8	4.8	4.8	na	na	0.0	0.0	na	na
Farm sector share (%)	0.7	0.8	1.0	na	na	11.1	19.2	na	na
Total agricultural imports (\$ billion) <sup>1</sup>	41.0	45.7	52.7	57.7	64.5	11.5	15.3	9.5	11.8
Total agricultural exports (\$ billion) <sup>1</sup>	53.3	56.2	62.4	62.5	68.0	5.4	11.0	0.2	8.8
Export share of the volume of U.S. agricultural production (%) <sup>2</sup>	22.8	23.3	22.9	22.1 p	na	2.2	-1.7	-3.5	na
CPI for food (1982-84=100)	176.2	180.0	186.2	190.7	na	2.2	3.4	2.4	na
Share of U.S. disposable income spent on food (%)	9.8	9.8	9.7	9.9	na	0.0	-1.0	2.1	na
Share of total food expenditures for at-home consumption (%)	52.2	52.0	51.5	51.5	na	-0.4	-1.0	0.0	na
Farm-to-retail price spread (1982-84=100)	221.2	225.6	232.1	238.3	na	2.0	2.9	2.7	na
Total USDA food and nutrition assistance spending (\$ billion) <sup>1</sup>	38.0	41.8	46.2	50.9	na	10.0	10.5	10.2	na

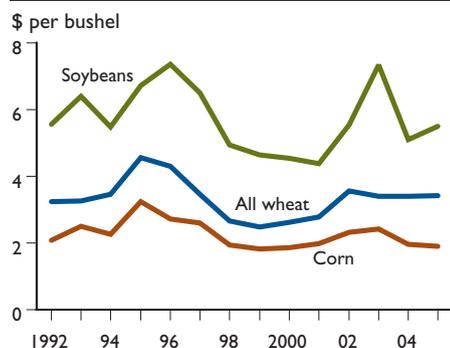
f = Forecast. p = Preliminary. na = Not available.

<sup>1</sup> Based on October-September fiscal years ending with year indicated.

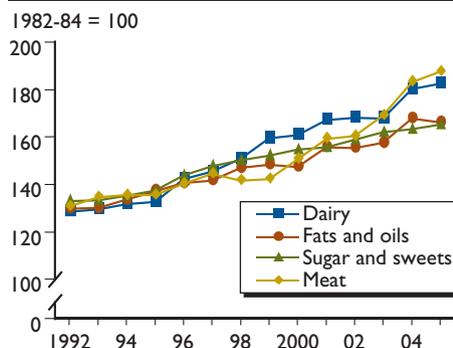
<sup>2</sup> The methodology for computing these measures has changed. These statistics are not comparable to previously published statistics.

Sources and computation methodology are available at: <http://www.ers.usda.gov/amberwaves/indicatorsnotes.htm>

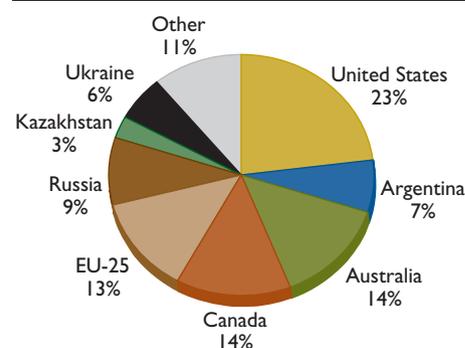
### U.S. average prices received by farmers for wheat, corn, and soybeans



### Consumer price indexes for selected foods consumed at home



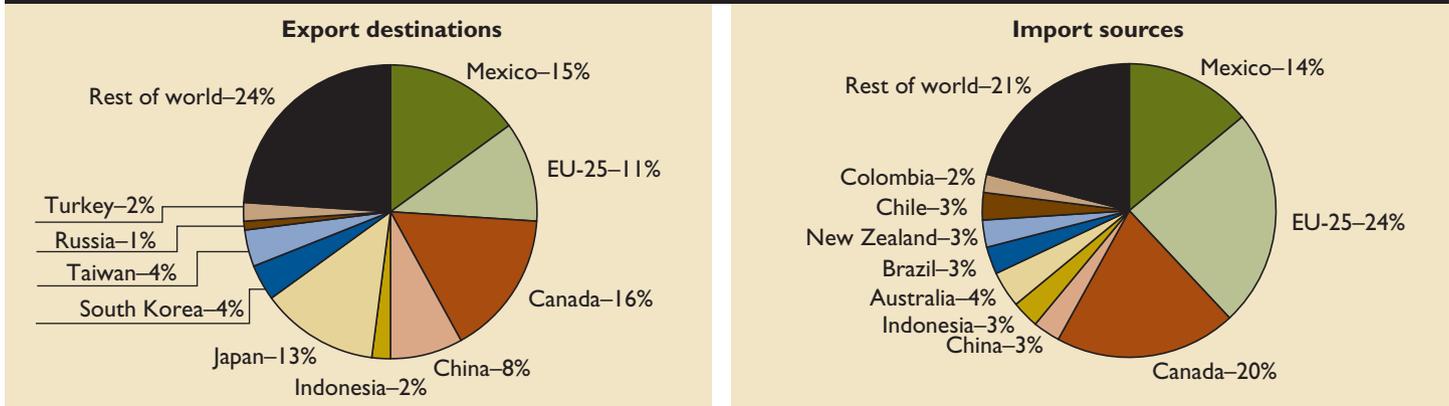
### The world's major wheat exporters, 2005/06



For more information, see [www.ers.usda.gov/amberwaves/](http://www.ers.usda.gov/amberwaves/)

Markets and Trade

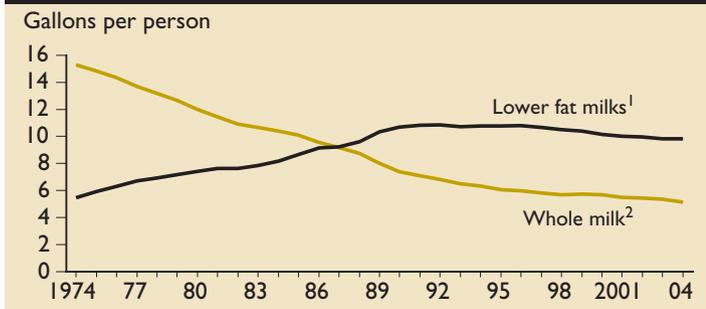
Three trading partners accounted for 44 percent of U.S. agricultural exports and 58 percent of imports in fiscal year 2005



Source: Compiled by USDA, Economic Research Service using data from Census Bureau, U.S. Department of Commerce.

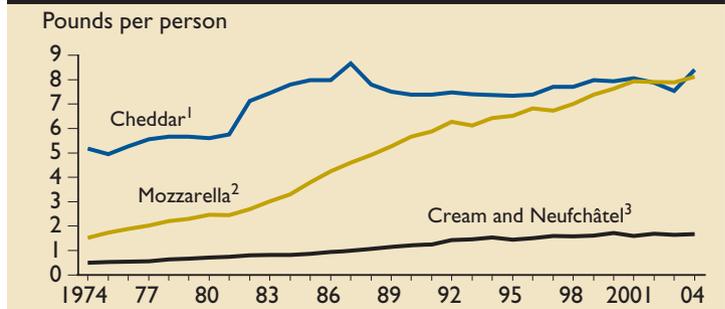
Diet and Health

While Americans are switching to lower fat milks ...



<sup>1</sup> Lower fat milks include plain and flavored reduced-fat milk (2 percent fat), buttermilk (1.5 percent fat), low-fat milk (1 percent fat), and fat-free milk. <sup>2</sup> Milkfat content of 3.25 percent.

...they are increasing their use of cheese

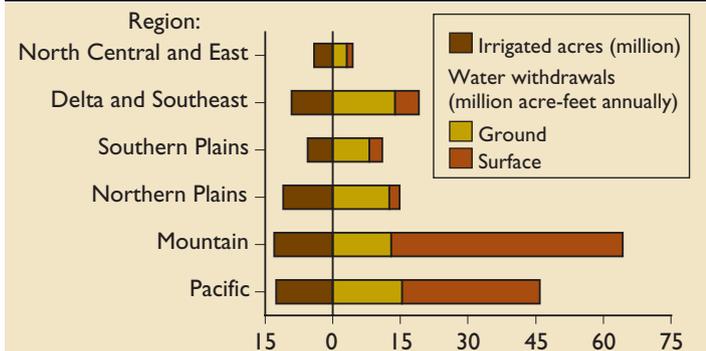


<sup>1</sup> Milkfat content of 50 percent or more. <sup>2</sup> Milkfat content of 30 to 45 percent. <sup>3</sup> Neufchâtel has a milkfat content between 20 and 33 percent. Cream cheese has a milkfat content of 33 percent or more.

Source: USDA, Economic Research Service, Food Availability (Per Capita) data, adjusted for spoilage, plate waste, and other losses. The data are a proxy for consumption.

Resources and Environment

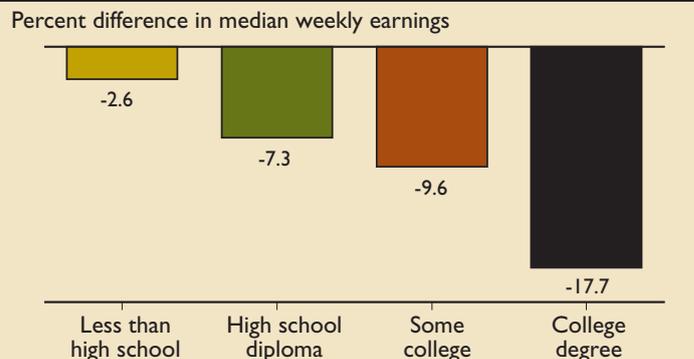
Irrigated acres and water sources in the U.S., by region



Note: North-Central and East includes the Corn Belt, Northeast, Appalachian, and Lake States regions. Sources: Irrigated acres from the 2002 Census of Agriculture. Water withdrawals from the 2000 U.S. Geological Survey. These data are published in "Chapter 2.1: Irrigation Resources and Water Costs," AREI 2006, EIB-16.

Rural America

Nonmetro median weekly earnings were less than metro across all education levels in 2003



Source: Analysis by USDA, Economic Research Service of 2003 Current Population Survey earnings file. Estimates based on metro-nonmetro definition as of June 1993.

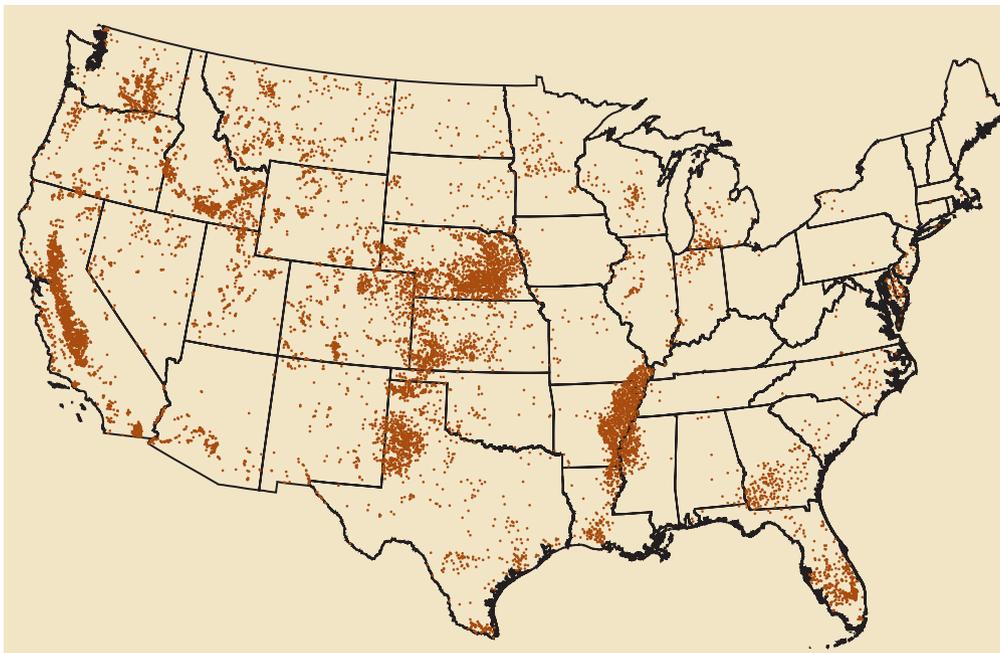
## On the Map

### Irrigation is a growing production technology

Irrigated agriculture is distributed across the Nation. While the West still has the greatest number of irrigated acres, regions in the East—particularly the Mississippi Delta and areas of the Southeast—now rival the density of historically irrigated areas in the West. Increased irrigation in relatively humid Eastern regions has heightened water supply concerns, especially during dry years and in locations experiencing fast growth in water use. Water supply limitations are no longer viewed as a “Western” issue in areas where irrigated agriculture is a major water user.

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### Irrigated land on farms, 2002



One dot = 5,000 irrigated acres.

Source: USDA's National Agricultural Statistics Service, Census of Agriculture, 2002.

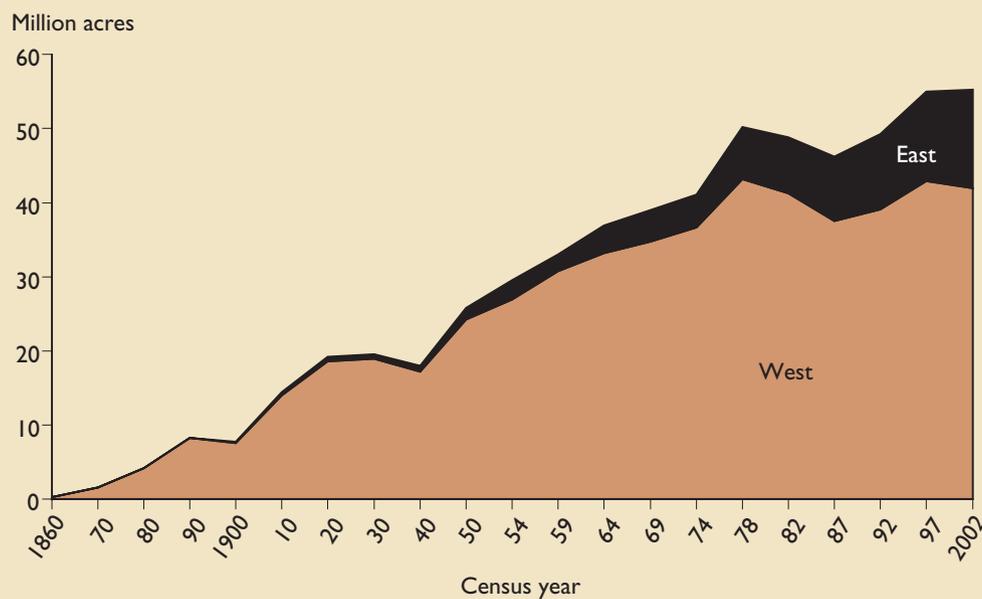
## In the Long Run

### Irrigated acreage has expanded across the Nation over the decades

Over the past 140 years, the number of acres irrigated has increased steadily, with only three interruptions. The last decline, in the later 1980s, was due to drought and policy-imposed land-idling requirements. Growth in recent years has slowed, relative to the longrun trend. Double-digit rates of growth in Eastern irrigation—first recorded in 1900 as “rice lands”—since the mid-1980s have more than offset recent declines in the West.

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### Irrigated land from 1860 to 2002, by region



Source: USDA's National Agricultural Statistics Service, Census of Agriculture, various years.